Development of Science Education Programme
for
upper primary classes
based on
Environmental Approach

PROJECT REPORT

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CHAPTER - I

PREFACE

The last few decades have seen an unprecedented growth in Scientific knowledge and its application to technology in various fields of human life. Science and technology have started to make an impact on the everyday life of citizens, which makes it imperative that all particularly the young ones - the future citizens of India, should have atleast some understanding and appreciation of those aspects of science which affect their daily life and future. This demands that the teaching of science should permeate life as a whole to enable the students not only to have a better understanding of the surrounding world but also to improve their material status later on when they enter life as prudent citizens.

In the light of the foregoing considerations, the goal of teaching science at the elementary level as a component of basic functional and meaningful education and also as an integral part of scientific and technological development should be to create in the learners, at the upper primary stage, an awareness of their environment - physical, biological and social, and of

the national development efforts of the country so as to fit them into and prepare them to play their important and useful role in the society. Moreover in a society where the scientific enterprise has begun to influence daily lives, science teaching should train the young mind gradually in the fundamental principles which govern scientific and technological processes and thereby encourage them to develop proper scientific attitudes and the necessary technological skills.

In the light of the latest philosophy of science education at the elementary level, as discussed above, a new approach to the teaching of science will have to be considered, inevitably involving a change in the science curriculum, the change in the curriculum from this point of view will not be the prerogative of the educationists alone. The whole resources of the community and the surrounding environment must be involved in this change so that the curriculum design reflects the development needs of the society.

Keeping this point in view a detailed research project entitled Development of Science Education Programme for upper primary stage based on environmental approach was formulated and submitted to E.R.I.C. Secretriat of

N.C.E.R.T. New Delhi. After a prolonged correspondence with the experts, the project under reference, was approved as a pilot study project after modification as and where necessary.

Obviously the project work is an interesting study. The date collection and its analysis leads to very revealing inferences, which bear eloquent testimony to the relevence and usefulness of the project.

The recommendations, based on the detailed study in different parts of Rajasthan are sure to prove immensely useful for the science education plenners and curriculum framers at the National as well as State level.

I am extremely grateful to Prof. R. P. Singh and other Member Secretaries of E.R.I.C. for their thoughtful help and valuable guidance in the project work from time to time.

The experts deserve all appreciation and gratefulness for their free and frank opinion about the universe of the project and its methodology at different stages of the project.

My sincere thanks are due to Dr. H.R. Tyagi, Dr. Madhusudan Sharma, Dr. Vijai Narayan Mathur and other

and other experts of the University of Udaipur for all the trouble taken and incecessent efforts made by them on making the project work a real great success.

My thanks are also due to all heads of the Institutions situated in different parts of Rajasthan and the Science teachers and students who readily responded through filling in questionnaires or participation in the seminars / workshops from time to time.

Mrs. Snehlata Sharma, Headmistress, Govt. Girls Higher Secondary School, Jagdish Chowk, Udaipur, who has been a reputed science educator and also a prominent resource person in the seminar / workshop organised by N.C.E.R.T., did a lot of spade work in this assignment full of great potential. Without the willing cooperation of Shri S.K. Sharma, Headmaster, Govt. Secondary School, Debari, it would have not been so much related to actual life situation. As such my sincere thanks are due to both of them.

The young kids of various institution, who responded enthusiastically to questionnaires and smartly replied to personal interviews, need and deserve all appreciation and thanks. The present study is sure to be immensely useful to the younger generation in the State of Rajasthan in particular and the country in general.

B.P. Joshi
Project Director

CHAPTER - II

INTRODUCTION

We recent trend in school education is to make the school curricula more relevant to the needs of the society at large and the individual in particular. So far the practice has been to impart instructions to school children about the scientific facts that are more abstract than of practical value in the immediate future.This defect in the syllabi is well recognised by the educationists and accordingly attempts are being made to shift the emphasis from rote learning to understanding, from theoretical to practical importance of the contents and from remote environment to immediate environment. The courses, to be adopted so as to make educational experience more meaningful to the child ultimately, led the researchers and educationists to recognise the role of environment in education. This necessiated that the environment be understood in its right perspective and attempts be made to identify the elements of environment related to school education.

STATEMENT OF THE PROBLEM :

To identify and select the indices of environmental

problems in the state of Rajasthan and incorporate them in the science curricula at this level, would include broad environmental areas such as agriculture and vegetation, human and animal habitation, physiography, environmental sciences (e.g. study of sanitation and pollution problems), local industrial resources alongwith the elements of natural sciences like physics, chemistry and biology that influence the formation of immediate environment. Thus the fesearch study shall be an attempt to evolve a new pattern of education seeking an ever increasing relevance to the needs of the community that would throw light on interrelationship between man and his environment.

BRIEF OVERVIEW OF THE WORK ALREADY DONE :

Environmental education is a relatively new concept, having come into prominence during the late 1960's, although the intellectual root of environmental education is of ancient origin.

Schmieder (1975)* high lighted some fundamental goals, concepts and objectives involved in environmental education. He emphasized that the way, in which society

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The nature and philosophy of environmental education : Some Fundamental Goals, concepts, objectives and Development issues. Unesco - Environmental Education Programme.

looks at problems and makes the decision need basic reforms and in this educational system plays an important role. Environmental education may just be the first educational speciality group in history to be concerned in the educational speciality group in history to be concerned in the education of everyone. Schmieder defined environmental education as"Who we are, where we belong and where we are going". He also reviewed various definitions of environmental education. He visualized that environmental education is an interdisciplinary approach which relates all subject areas to the whole Earth " Oneness of approach " and the problems and difficulties of the environmental field are also taken care off. He classified environmental education objectives, following Bloom's.

TAXONOMY OF EDUCATIONAL OBJECTIVES -

N.C.E.R.T. Organised a Regional workshop on the use of Environment and Improvisation from local resources for science education at Primary School in October, 1977. This workshop developed a curricula for class I to class V. It also suggested the type of teacher training programme for environmental studies. The workshop finalised the manuscript for printing the instructional guides on use of environment and improvisation from local resources.

In one of the papers circulated byUNEP in October, 1977, the background of environmental education was analysed. This analysis is based on Belgrade workshop (1970) which highlighted guiding principles of Environmental Education Programme, such as, the totality of environment.

More recently a team of Indian experts, sponsored by UNESCO, visited various countries and found that in countries, where environmental education is at take-off stage, have been motivated by their major drawbacks in existing curriculum, which was divorced from concrete life experiences of the child and also felt the need for ecological awareness in the use of and care of the environment .The team found that in Philippines the environmental education started in 1970 where the agricultural farm was taken as an environmental laboratory. The objective of this research was to develop greater involvement of children in the environment and to study its effect in the development of scientific concepts derived from realistic situation. This project laid emphasis on cooperative school planning, flexible scheduling, greater autonomy for teachers, concrete learning experiences, teacher made instructional units in science and need to integrate learning experiences in the school and out of the school.

The Nuffield Science Project, which was undertaken by the Nuffield Foundation, had close association with schools and each step was taken only after satisfactory field trials.

It takes the environment of its starting point.. Previously in Primary School Science, attention was limited to biological phenomenon. In this new approach biological and physical phenomenon are used and the idea of close relationship of both these sciences is brought about. It advocates a discovery approach ~~and~~ with greater freedom in the type of topics selected and in the depth and range of ideas involved as the investigation proceeds.

In our own country many environmental associations at the local, state and national level have, from time to time, thought over the problems of environmental studies, pollution, conservation of energy, health hazards and recommended very strongly the inclusions of these topics in the science education programme at the school as well as higher level.

In the state of Rajasthan, the State Institute of Science Education, played a vital role in restructuring the science syllabii at the upper primary stage. However, a systematic research study was deemed absolutely necessary

in the various parts of Rajasthan such as arid zone of desert areas, tribal belt of Dungarpur, Banswara area and dense forest areas of eastern Rajasthan.

Consequently a very comprehensive project spread over a period of four years was formulated by the project Director, when he was the Director of State Institute of Science Education, Rajasthan, and submitted to Prof. R.P. Singh, Member Secretary, E.R.I.C., N.C.E.R.T., New Delhi. Prof. Singh took a genuine interest in the project and sent it to the experts for their comments and suggestion. This correspondence between the experts, member secretary E.R.I.C. and the project Director took a long time to finalise the project. The E.R.I.C. Secretriat, in pursuance of the comments of the experts, finally approved the present pilot study, which is limited in scope and smaller in dimension. It was however, agreed by N.C.E.R.T. that on the basis of the findings and recommendations of the proposed study, a broad based project of a greater spectrum may be taken up later on. As such the present study was taken up in right earnest after its formal approval.

The proposed study envisaged the following research questions.

Research questions and hypothesis :-

The specific research problem is to select different areas in Rajasthan where the geographical and demographical conditions play a significant role. In these areas a systematic and scientific study is to be done so as to find out as to what extent environmental studies are included in the present day syllabus. What are its short comings and omissions ?. Thereafter on the basis of the findings and inferences drawn a brief outlines of the syllabus for the upper primary classes based on the environmental approach shall be formulated so that the same may form a consistent and well articulated study well suited to that particular age group. At every stage questions will have to be asked in decisive terms, how and in what manner environmental studies could be incorporated so that education as such, becomes not only realistic but also appealing to the learners as well as the teachers.

Universe of study -

The following aims and objectives will be covered.

A. General :

(i) To provide education through problem solving method so that when confronted with environmental

problems or any other problems related to life situations, the challenge could be met with effectively and courageously.

(ii) To emphasize, at all stages, in the manner and to the extent, conducive to the existing conditions and situations, the inter disciplinary nature of the environmental education.

(iii) To work for the growth of environmental education through formal and nonformal approaches.

B. Specific :-

(i) To locate environmental problems, particularly in the state of Rajasthan, which may have bearing with the rural and semi-urban life.

(ii) To analyse and enumerate the scientific view points and the implications of the problems so located and thereafter grade them according to their sophistication.

(iii) To inject them into the school curriculum and thus making the programme environmental oriented.

(iv) To prepare instructional material and supplementary reading material, both for the students and teachers.

Sampling frame :-

The environmental problems differ from area to area in Rajasthan. For instance the problems of dry and arid regions can not be the same as those of the regions which have plenty of rainfall. Also the problems of water pollution, air pollution, food adulteration, conservation of natural resources differ from place to place in a big or small measure. Moreover there is also a close relationship between environment and day to day social life.

In the process of sampling of areas or regions for environmental studies in depth, care will be taken that all sorts of environments are properly represented. It would be, therefore, advisable to sample out regions of all types such as industrial areas, agricultural areas, areas with poor water resources, non-agricultural areas, desert regions where problems of blown sands are the most important, areas which are interpersed by rivers, socially backward areas, hilly tracts etc.

In each of the four regions (as described in the universe of the study) 18 representative blocks would be selected on the basis of the following criteria. For each block one school will be selected.

Geographical cultural	Geographically favourable		Geographically moderately favourable		Geographically unfavourable		Total
	Cultural		Cultural		Cultural		
	Advanced	Backward	Advanced	Backward	Advanced	Backward	
Economically advanced	1	1	1	1	1	1	6
Economically moderate	1	1	1	1	1	1	6
Economically backward	=1	1	1	1	1	1	6
Total	3	3	3	3	3	3	18

In each block, a list of upper primary schools shall be drawn. 5 % of these total schools in a block shall be selected for the study using the random sampling technique. In each block 50 % of these selected schools will be fixed as control group.

In each school one section of 6th, 7th, and 8th classes shall be included in the study. If there are some schools where there are atleast two sections in each class, one such section shall be fixed as control group for purposes of comparisons within the school.

For the purposes of analysis composite classroom impact index shall have to be worked out. It is necessary

to develop composite index because the study of impact on individual child will not help in developing a universal environment - education curricula. Only the study of classroom as unit can provide insight into the effectiveness of the curriculum.

Data collection :

Data collection with respect to specific objectives mentioned earlier, will be collected with the help of instruments indicated against each. Objectives as under :

	Tools/source
I. (a) To identify the environmental characteristics of each region (Geog.,Cultural and Econ.).	Secondary sources
(b) to identify the environmental characteristics of each block (Geog. Cultural and Econ.).	Secondary sources
II. Identification of environmental indices being taught to children. (a) in each region (b) in each block.	1. Existing Gen.Sc/ Text books 2. Interviewing teachers. 3. Questionnaires 4. Group discussion 5. Short discussion. 6. Short duration seminars. 7. One day meetings.

On the basis of the above information a comprehensive list of environmental indices will be prepared.

Procedure to collect data from the field : -

On the basis of finally selected list of environmental indices of each block, questionnaires will be prepared to ascertain the degree of awareness of environmental. These questionnaires will be administered to students as well as teachers. The questionnaires will be prepared as to accomodate geographical variations from district to district. This will help the researcher to know the awareness of the teachers and the students of their environment. The teacher's familiarity with his environment can help him to explore for developing scientific concepts from the environment. The environment will be an open laboratory for the child. So it is essential that the teachers should be fully aware of the components of its laboratory. So the teacher's level of awareness will help to find out the need to arrange teacher's workshops for the successful implementation of the curricula.

Similarly child's level of awareness of this environmental laboratory would facilitate teacher's task of teaching scientific concepts of environment and would also help the curricula makers to decide about the content for each age group.

Attempt shall also be made to use 'Karl Roger's Model of Diffusion ' of Innovations ' of which awareness is the first stage.

Data processing :-

The data collected from the field will be analysed.

1. To categorise the environmental indices and their environmental effects.
2. To determine the difficulty level of various environmental constructs used in the questionnaire and thereafter.
3. Intercorrelations between scientific concepts and environmental concepts will be worked out.
4. Regional vatiations of the environmental indices will also be worked out.

The frequency of environmental concepts taught in the existing text book will be determined.

Note :-

1. The outcome of the above analysis will be in the form of a workbook for children and guide book for teachers.
2. No statistical techniques of analysis are being specified as it is proposed to hold workshops of

experts that would discuss in detail the type of statistical technique to be used.

Evaluation :-

In the second phase of the project, the workbooks (teaching material) and teacher's guides shall be tried out for their effectiveness.

For this 5 % schools of the sample will be selected randomly. Half of these will form the control group and the other half the experimental group. The teaching material prepared, will be tried out in experimental schools for one year while the schools chosen for control group will be using the existing teaching material.

Achievement tests will be prepared and standardized to compare the effectiveness of the teaching material developed in this project with that of existing one. These tests will be administered to both control and experimental groups.

For the purpose of analysis, a composite classroom impact index shall have to be developed. It is necessary because a study of the impact on individual child may not be of much help in developing a universal environment education curricula. Only the study of classroom as unit

can provide insight into the effectiveness of the curricula.

Draft syllabus :-

Thereafter on the basis of the inferences drawn and subsequent recommendations made outlines of the draft syllabus of science education for upper primary classes shall be developed.

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CHAPTER - III

JOURNEY OF THE PROJECT

The present investigation is to design environmental education programme for primary and middle school based on the opinions of students studying in primary and middle classes, school teachers teaching science, University teachers engaged in teaching and research of environmental sciences and discussions held with members of governmental and non-governmental organisations - local, regional, national and international, engaged with the theme of environmental studies and conservation.

Study areas were selected in such a way so as to cover variety of socio-economic and cultural groups having different characteristic traditions, needs and problems depending upon their specific environments.

Two questionnaires were prepared and supplied to students and science teachers in which they were asked to comment upon the existing science curricula and any change they would like. The students, selected for this proposes, were from rural as well as urban areas studying in IV to IX classes. The students were choosen belonging to both the sexes and age group varying from 10 to 18 years (Tables).

Teachers of 21 to 47 years age group from the schools of Debari, Dheekli and Bhaisda Kalan villages having education qualification ranging from secondary to post-graduation and teaching experience from 4 to 27 years were selected (Table ,), sixty eight teachers from the schools of urban areas in age range of 21 - 49 years, and qualification from secondary to post-graduation with 3 to 29 years teaching experience were selected.

Seminars of Head Masters were organised for assessing the need of environmental education and to suggest possible form of science curricula for primary and secondary classes. University teachers belonging to the departments of zoology, Botany , Physics, Chemistry, Geography, Sociology, Economics, Psychology and Commerce were consulted for this study. Discussions with these teachers, local governmental authorities especially of forest conservation and voluntary workers of some non-governmental organization were held in order to understand the changes needed in the present pattern of education to make it more environmentally oriented.

Representatives of Udaipur Environmental group, National environmental association, Environmental Awareness Association and International Youth Federation

for environmental studies and conservation were among the main participants in discussions. Experience of organization like Seva Mandir are also incorporated in this study.

Parents of students in rural and urban areas were consulted about the usefulness or not of the present educational system and about their views on environmental education.

The emergent opinion favoured the establishment and spread of environmental education at all levels of formal study. Environmental education is not only desirable but vitally necessary to have environmental literates and environmentally oriented citizens in order to preserve and protect the quality of environment that effects our life every day and every moment. They said that an increased recognition and materialisation of environmental education programme shall develop in common man a requisite concern for environment.

Problems of developing countries were recognised to be due to issues like poverty, safe drinking water, housing, agricultural production and employment. Fast population growth and increasing urbanization complicates

the matter. Difference in attitudes of individuals, negligence of society as a whole and compartmentalization in the work of professionals results in lack of concern for environmental quality. In view of the individual ignorance of man's ability to preserve (or destroy) the environment. It is considered necessary to promote environmental education with a quick pace. A wider environmental awareness ought lead to feeling of urgency about environmental conservation which is a priority need in the third world.

The teachers felt that designing the environmental education programme would be facilitated by spelling out the objectives of such an education. The objective of environmental education are recognised as under -

- to develop a concern and respect for the total environment.
- to generate favourable attitude and behaviour as well as appreciation and interest for the wise use of environmental resources.
- to provide an understanding of environmental interrelationship and to determine desirability of altering them or not.

- to focus attention on asthetic, ecological health, economic and social implication of environmental pollution.
- to evolve recognition, commitment and responsibility for ensuring a healthy environment for the present generation and posterity.
- to foster interest for personal involvement in positive action to solution of environmental problems.

At the moment the purposes can be served by introducing an environmentally oriented science education programme for the first to eighth classes. The existing general science courses can be reconstructed, where in some of the following concepts can be emphasized : environmental interrelationship, energy flow, material cycling, entrophication, pollution and waste management, wild life preservation and above all environmental conservation. Human ecological ideas would have to be given so that a way of living can be visualised with reference to rising population and environmental health. Health and hygienic and moderately decent living vis-a-vis environmental resources would require inroads of knowledge of related principles of social sciences

as integral aspect of environmentally oriented general science programme. As such, the new curricula have to integrate several disciplines into one, an attempt at a synthesis, making a sense to a young growing boy or girl, who experiences the complexity of environment in the family, school and social groups. The development of such programmes at different levels calls for setting out appropriate goals (consequent to determining the priorities) in confirmity with the objectives set out above. Furthermore, taking the local and regional facilities into account the duration of training of teachers and available training resources have to be considered.

The rural and most of the urban students find the present science teaching to be a sort of monotonous dry feeding by teachers in class rooms. In the absence of employing the use of audiovisual materials, models, reading material, discourse and discussions and visit to nature, such a reaction in understandable, Therefore, it can be suggested that the curricula be made field based alongwith class room work, to make the education more interesting than it is today. Further, the curricula contents and text books need refer to the concepts and

principles ; their application and examples should be left for the teachers to determine and concentrate on the basis of local and regional environment. This may rationalise expenditure on a requirements of teaching - aids and equipment as it has to be local, specific and seeking adaptiveness to local environmental and environmental resources.

An area of monotony and load heaviness is resultant of the fact when the syllabus details and teaching methodology is expected to be one and the same through out the states varied geographic regions irrespective of a school being located in desert, hilly, forest, humid area or a well irrigated agriculturally productive region. A syllabus is a sort of external imposition when a teaching learning process does not help a student observe, verify and manipulate what is around and with which he/she is familiar, constantly familiar in daily life. Experimentally oriented science education seeks to do just what is anticipated to be mentally acceptable to a student : to be able to observe and verify the concepts, principles and informations taught, is the environment he lives in is completely familiar with and is able to manipulate (experimentation ;investigation) what is available

at hand in daily life. The teaching - learning process would obviously be full of interest of involvement. The themes of science curricula thus need to have correlation with environmental problems and available environmental resources.

Thus, in general science courses in the disciplines like physics, chemistry and biology should not be taught separately but these should get inter knitted themselves and interwoven with some idea of geography, economics and sociology. Science can then be taught under major environmental headings like "water" "Earth" "air", "Energy" etc., wherein principles of physics, chemistry, biology etc can be taught by of interdisciplinary approach of science teaching which will be more practical and useful.

Suggested activities for the new science - teaching, in addition / substitution of class room can be an exposure to the local environment, data collection, measurement and sampling, experimentation, involvement, communication and public relation.

Success of environmental education depends upon the quality of teacher, his interest, abilities ,

attitudes, values and general educational level and teaching experience. So, there is an urgent need to train the teachers to teach science through the environment.

Most of the teachers dealing with students upto middle classes commented that books on physics, chemistry, and biology meant for general science education at present are difficult, they needs simplification. Not simplification but reorientation is probably the word. Simplification is not meant to seek degradation of standard but the theme to be tackled and language to be used has to be such as to bear relevance to understanding of life and environment a student lives with and bears a relation to the capacity to grasp of what is taught, to avoid a learning by rote, the learning should be of utility in general discourse and of general confidence of having benefitted from a school learning. Reorienting the existing courses of biology, chemistry and physics as to explain the environment and its phenomena that indubitably impinge the human life and civilization, growth , would make the general science course more interesting and relevant. The general science has to have an environmental approach.

It was also suggested by some experts that some specific areas may be identified based on the climate, geography, socioeconomic level, culture and religion and flora-fauna of that region to make area specific curriculum including some points of that specific area with general aspects, further. This approach will also help students to use the natural resources on national basis, to earn their bread inspite of going for usual type of office jobs.

It is a fact that environment is subjected to rapid negative changes, the present system of education is unable to make the youth group check it or to identify future challenges which they would be facing.

Urban students, teachers and experts were of the opinion that priority needs for formal education are the development of curricula, training of teachers and development of material aids and facilities to deal with following environmental problems.

1. Extra ordinary acceleration of the urbanisation process.
2. Pollution.

3. Lack of knowledge about ecosystems and their mamagement.
4. Irrational use of soil and water.
5. Depletion of natural resources.
6. Too rapid demographic growth.
7. Development without destruction.

It is a common knowledge that students of primary level are interested in learning from experience with real things that they can manipulate in some way. Such learning, in which a group of concepts is grounded in some natural experience is infinitely more meaningful than isolated verbal grasps, which may well be superficial and ephemeral. In the present system children are kept tightly packed in small uninspiring class rooms, where they learn every thing as second hadd and where learning by rote is predominant.

It was said by rural parents that education given to their children is not practical and useful and ignores their needs. This problem may be solved by giving the teacher responsibility of modifying the skeleton of science curriculum according to the local environmental needs.

Urban parents were worried about increasing

indiscipline among students and lack of practical and meaningful education for over all mental development of the student. Teachers of the urban areas as well as rural areas also expressed similar opinions.

The above mentioned problems may be solved by making present science curricula, inter disciplinary and field based, to make it simple, interesting, practical and useful in the context of the environment where a student lives. As such the journey of the project comprises of the following steps -

1. Data collection,
2. Data analysis.
3. Interviewed with students and teachers.
4. Meetings and seminars - school teachers University lecturers and professors and science educationists and environment studies experts.
5. Inferences.
6. Recommendations.
7. Development of science education programme for upper primary classes based on environmental approach in the light of the inferences drawn and subsequent recommendations made.

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CHAPTER - IV

DATA COLLECTION AND ANALYSIS

The present study is aimed to design environmental service education programme for primary and middle schools. The tools of the study have been, interviews with the concerned teachers and students, group discussions, seminars and personal discussions with the persons of repute in this field.

Two separate questionnaires were prepared - one for the teachers teaching science subjects in the upper primary classes and another for the students. The questionnaires were prepared in a way to assess the opinions of the respondents about the present science education system and curriculum. The main theme of the questionnaires was whether the present science curriculum for upper primary classes has been successful in imparting environmental education to students. After the completion of questionnaires a pilot survey was conducted to give the questionnaires a final shape.

A fixed sample of 84 teachers and 126 students was taken by random sampling for the purpose of interview. The

selection of respondents was made from different primary and middle schools located in the different parts of the state of Rajasthan. Out of 84 teachers selected for the interview 16 belong to those schools situated in the rural areas. Remaining 68 respondents were from urban schools. On the part of student respondents 100 were from girl and 26 were boy students studying in the upper primary classes (i.e. class IV to IX). The names of selected schools and number of respondents for the purpose of this study are given here under.

Names of selected schools :

Primary and middle schools of Udaipur, Bhilwara, Jahajpur, Kankroli, Dungarpur, Bundi, Kota, Jhalawar, Pali, Alwar, Deogarh, Chittorgarh, Jaipur, Abu Road, Sardargarh, Bankora, Rajnagar, Kherwara and Delwara.

Number of respondents -

	Teachers	Number
(a)	Teaching in Rural areas	16
(b)	Teaching in Urban areas	68
	Total	84
	Students	
(a)	Girl students	100
(b)	Boy students	26
		126

Thus a total of 84 teachers and 126 students are interviewed for the purpose. The data has been analysed through presating in the form of a table to present a simple picture (See Appendix ___ for table).

DISCUSSION

Rural Teachers :-

Primary and middle schools from urban as well as rural areas were selected to give the project a wide range. A total of 16 teachers teaching in the schools situated in the rural areas were interviewed. They were from Debari, Dheekli and Bhairda Kalan. The age of these teachers ranged from 21 to 47 years. As about the educational qualification of these teachers, one in postgraduate, two are graduate in science while five teachers are graduate in arts. Four teachers are educated upto Higher secondary and the remaining four upto High School. Teachers teaching experience ranged from 4 to 27 years. Two teachers have eight years administrative experience while one has five years.

Out of sixteen, thirteen teachers opined that the present curricula has not been successful in integrating

the knowledge of students and therefore, they stressed a great need in the overall change in it. Fifty percent of them agreed that the curricula is insufficient. The respondents were divided equally on the question that the present curriculum is suitable to the changing social needs and changing environment. However, almost all conceded with the fact that it eradicates social degrees. A large segment of respondents complained that the present courses could not be completed during session. The curriculum neither fulfills the objects of science nor includes the different branches of it. More than half rural teachers feel that at the time of inclusion of contents, the mentally physical and intellectual aspects of students have been neglected. Only a small segment replied in affirmative on the question that the present curricula gives detailed information about mountains, plateaus, rivers, ponds, springs and canals - the major environmental fetors. They complained about the lack of information regarding environment in the present syllabus. However, about 70 percent respondents realised that the courses have made more easy and interesting by introducing figures and diagrams. It is also a hopeful aspect about about the present curriculum while most of the respondents agreed that it provides sufficient information about forests and things related to daily life. About 85 percent of the

selected rural teachers replied in negative when they were asked if the course contents have been included from easy one to harder one. The curricula has not been successful in the development of mental abilities of a child and it is not suitable to the rural needs and circumstances. Seventy five percent of the selected rural teachers opined that the standard of questions, the pattern and form of contents is tiresome and boring to students. The present system is not suitable to local environment. The curricula does not make any difference between climate and weather - the two major environmental factors.

On the basis of the foregoing statistics it can certainly be said that the present curriculum for upper primary classes (i.e. class IV to IX) needs a great change. The responses communicate that environmental aspect has been completely neglected. Therefore, it is advisable to prepare the new educational programme on the guide lines of environmental education. The curriculum must be interesting, practical and suitable according to varying environmental situations. There should be a correlation between the existing education and environment in itself is a living laboratory and in the modern age

the knowledge of environment is a must in these classes.

Urban Teachers :-

Out of 84 teachers interviewed 68 belong to those schools situated in urban areas. The age of these urban teachers varies from 21 to 49 years. Six teachers are postgraduate in science and thirteen are in arts. Twelve interviewee are graduate in science and ten graduated in arts. Thirteen teachers have educational qualification upto higher secondary while only four respondents are educated upto matric. The teaching experience of these urban teachers ranged from 3 to 29 years. As about the administrative experience, five teachers have more than ten years administrative experience. Most of the teachers do not have administrative experience.

Forty seven teachers out of sixty eight feel that the present curriculum does not integrate the students knowledge with the environment. Seventy one percent respondents desired that there should be a complete change in the existing curricula. However, more than half of the responses indicated the suitability of it according to the need of the society and environment. Seventy five percent urban teachers had expressed this

feeling that the curricula has not been successful in eredicating social dogmas. The responses divulge that course contents have not been included from easy one to harder one. The data also confirm that the curricula is not sufficient for children. It does not includes in it the main different branches of science. Fifty seven percent of teachers expressed their feeling that the standard of course contents is not suitable to the physical, mental and intellectual standard of students. The responses communicate that the curriculum is quite efficient in differenciating between local climate and weather. Most of the respondents replied in negative when they were asked if the present curricula has been made easy, motivating and interesting through introducing figures and diagrams. Fifty five respondents differed with the opinion that the curriculum is helpful in the comparative study of creatures and plants. Forty four teachers were of the opinion that the standard of questions, the style and manner of contents, is tiresome to students. Seventy six percent of the respondents opined that the present curricula neither provides sufficient knowledge regarding forests, trees, soil, water etc. existing in the local environment nor includes mineral resources and a detailed knowledge of industrial sectors.

The responses communicate that environment has not been given its proper place in the present curriculum.

Therefore, a rational procedure should be adopted to introduce environmental education. Studdnts must be kept aware about local environment and its components viz. forests, trees, rivers, mineral resources and industrial areas. A local canal or river may be explored, for example, for depth direction, source, living creatures and type of traffic. In a rural area the possibilities include the land use, relief, flora and fauna, the farms and the villages. An urban area suggests the study of houses and building materials, traffic flows, market, shops, postal services, transport services and parks. There should be more stress on examples and well explained diagrammes instead of the number of chapters and contents. New discoveries and inventions should be introduced well in time. Every aspect of environment must be covered and not a single branch of science should be left untouched. The indispensable resources on which we survive - soil, water, vegetation - must be given a prominent place in our curriculum. The environmental education programmes should be designed to be relevant to local, regional and national conditions. The contents should be suitable according to the mental, intellectual and physical capacity of a child.

Girl students :

Now the other side of the coin is explored to project what obligations girl students feel towards the present curriculum.

Therefore, a total of 126 students were interviewed, one hundred students were girls and remaining twenty six were boys. The age limit of girl respondents ranged from 10 to 18 years. Twelve girl students did not indicate their age. Out of one hundred girls interviewed, nine were studying in class IV and nine in class IX, fourteen in class II, sixty six in class VII and two in class IX. Highest number of respondents belong to VIII class i.e. 66 percent.

Eighty eight percent respondents opined that the existing curricula is capable in developing insight and self confidence in children. The same number of students realized that it developes honest and liberal feelings. Ninty four percent responses tell us that the curricula stimulates children to acquire more knowledge. A significant percent of responses reveals that the curricula helps in solving the problems of student life in a systematic manner. Sixty eight percent responses communicate that the curriculum develops good habits and interests in a child. Most of the students realized

that the curriculum provides opportunities in selecting a job according to their ability. The respondents replied in affirmative when they were asked if the curricula provides knowledge about the universe. A large number of the students expressed their desire that the diagrammes in the chapters should be coloured and well explained. They confirmed that the curricula develops in the students a healthy and scientific attitude towards the life. The responses divulge that the curriculum is incomplete from the point of view of reality towards the life of children. There was a complaint about the curricula that it develops only the theoretical aspect in child. However, they conceded that it makes a comparative study of creatures and plants. The responses also confirm that the curriculum is capable in providing the latest information about changing environment. The data indicates that the curricula provides knowledge of the things available in daily life. When the students were asked if there should be a complete change in the present curriculum, most of them replied in negative. But they expressed their feeling that it does not raise the standard of education of students. The responses communicate that the curricula is unable to solve the problems of a student in a systematic manner. It neither develops

good habits nor good interests in a student. Education given to students is not pratical and useful in their life, consequently it ignores their needs. The curriculum is not capable in the development of behaviourable aspect in students.

The findings reflect that the curricula should not be changed completely. There should be some moderations and alterations according to needs. It must improve behavioural aspect of students. It could be modified in such a way that it may develop good habits and interests in a child. An increased recognition of environmental education will develop in students a concern for the environment. There should be scientific approaches to problem, involving a natural sequence of observation, recording, hypothesis, experiment and evaluation.

Boy students :-

A total of twenty six boy students were interviewed to know their opinion about the existing curriculum and environmental education. All of them belong to rural areas. The age limit of these respondents ranged from 13 to 17 years. Eleven students were studying in VII class while thirteen students were getting their education

in IX class. Only 2 respondents were inX class. The results were analysed through presenting the data in the form of a table.

Out of twenty six respondents, twenty four expressed this feeling that the curriculum is capable to develop self confidence in students. They also concluded that it improves honest and liberal feelings as well as the thrust to acquire more knowledge. The responses communicate that the curricula does not teach how to solve the problems of student life in a systematic manner. But they indicated that it inculcates good habits and interests in students. The respondents replied in negative when they were asked if the curricula helps in the development of cause and effect relationship capacity in them. Most of the respondents feel that the curricula is not capable to help the students in selecting a job according to their ability. The curriculum does not foster intellect in boys. However, they agreed that it develops a scientific attitude in them and provides information relating to the present scientific age. They desired that the diagrammes and pictures should be in colours. It will help and creat their interest towards the contents. The respondents opined that the curricula stresses only the theoretical aspect of contents.

They feel that it gives the latest information regarding the environmental changes. It makes a comparative study between creatures and plants, when their opinion was sought if there should be an overall change in the curriculum, the answer was in negative.

The data indicates that the curricula does not help in selecting a job. It neither solve the problems of a student life in a systematic manner nor develops practical aspect of life in a child. That is why the students feel it monotonus and burdensome. Therefore, the curricula should be reshaped in such a way that it may eradicate the feeling of insecurity in them. An environmental education policy is indispensable for the development of condlidence and initiative.

Environmental oriented studies presents to the students real problems for identification and the resources for the solution. It is here the curricula becomes most naturally integrated and where children can most easily gain both interest in, and conceptual understanding of, their world, by genuine learning through first hand experience.

CHAPTER - V

SEMINARS AND MEETINGS

In addition to the Research study in various districts through questionnaires from teachers and students, formal and informal discussions were held, seminars and meetings of teachers, science educationists were organised.

In the various Departments of the University of Udaipur there is a galaxy ot scientists and science educationists. A number of meetings were held with them from time to time during the project period and discussions on the prevent syllabus and the desired modifications were held in detail. These discussions went a long way in substantiating the data analysis and drawing the inferences and making the recommendations. A good deal of guidance was also available from these illustrious persons in developing the proposed science education programme for the upper primary classes (please see appendix I).

The science educationsists in the State Institute of Educational Research and Training Rajasthan and elsewhere took keen interest in the

research study since the study involved direct relevence to the curriculum followed in the State of Rajasthan. As such group meetings were held from time to time with these educators and research workers.

Shri S.K. Varma, Conservator of forest, Udaipur, took a keen interest in the project work since the conservation of natural resources, protection from various types of pollutions and removal of ecological imbalances are his direct concerns and specific assignments.As such the discussions held with him paved the way in comparing the data analysis and the inferences drawn and subsequently developing the desired science education programme based on environmental approach (Please see appendix 2).

In connection with the project work a three day seminar from 15.1.80 to 17.1.80 was organised at Udaipur in which 33 teachers from rural, and semi-urban areas participated. Some of these teachers came from very remote tribal areas of Dungarpur, Banswara and Pratabgarh (please see appendix 3). These teachers, being the root workers in the field working in primary and upper primary schools, took keen interest in the

project work. They discussed in details the existing text books in science and analysed their merits and demerits with particular reference to the environment. The suggestions given by them in the questionnaires were found to be very useful. The same have been taken into consideration while developing the science education programme for the upper primary classes. The situations, circumstances for the upper primary classes. The situations, circumstances and environment prevailing in rural areas differ very much from that of rural areas. Keeping this in view after organising the three day seminar of the rural teachers from 15.1.80 to 17.1.80 it was thought desirable to hold a one day meeting of the science teachers working in the urban area of Udaipur. Since the scope of the project was limited it was thought proper to call the teachers working in the primary and upper primary schools of urban area.

Accordingly a one day meeting of teachers was held on 28.2.80 at Udaipur, in which 20 teachers participated (please see appendix 4). The discussions were found to be very interesting and lively. It was quite a different experience when compared with the nature and scope of discussions held in the seminar

of rural teachers. The science teaching in the primary and upper primary schools in urban areas was said to be confined to the four walls of the class room. The science teaching was said to have no relevence to the nearby surroundings and the prevailing environment. The observations of this meeting also helped in drawing the inferences and making suitable recommendations as well as developing the proposed syllabus.

The Environmental Studies Association of Udaipur has been doing a Yeoman's service to the noble cause of developing awareness about the problems of conservation, pollution and ecological imbalances. It has been actively engaged in drawing the attention of the authorities at various levels about the dangers and their ill effects on the community at large. Dr. M.S. Sharma, the main investigator of the project happens to be the secretary of the aforesaid association.

As such a number of meetings were also organised with the members of the Association. The discussions held and observations made were really very useful and relevent to the present study. These meetings and discussions immensely helped in developing the proposed science education programme at the upper primary stage.

The environmental studies Association of Udaipur has been working in close collaboration with the regional Associations of Rajasthan, Ahmedabad as well as the National Association, Quite a good number of meetings and seminar were held at Udaipur during the project period and also world environmental day. The deliberations held in the seminar immensely contributed in the research study and development of syllabus under reference.

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CHAPTER - VI

INFERENCE

Environmental education at upper primary level is not just essential but vital to product environmentally literate and environmentally oriented citizens to preserve, protect and promote the quality of our environment. The environmental education programmes should be designed to be relevent to local, regional and national conditions and drawn upon the resources of country through an effective collaboration between teaching institutions, industries and public environmental agencies.An increased recognition for environmental education, which will develop in a man, concern for the environment in a vital subscription to stimulate and maintain a concern for human well being.

The importance of the environmental education has been brought in lime light through the alarming trend in environmental pollution in the last two decades ; but it still is lacking the 'glamour' of subjects like computor technology, electronics and nuclear energy. The curriculum for primary classes

should recognize this fact and must, therefore, develop in the students insights and skills needed to influence not only the environmental attitudes and behaviours in the students but also to stimulate their reorientation of values regarding the importance of environmental studies.

Children at the primary stage are interested in, and learn from experience with real things that they can manipulate in some way. Such learning, in which a hierarchy of concepts is grounded in sense experience is infinitely more meaningful than a mere verbal grasp which is not so grounded, and which may well be superficial and ephemeral. Conceptual development depends on the range and quality of such real experience. The environment must be appropriate not only in physical terms, but also in its social aspects, so that the experiences may be stimulated and guided towards valid educational goals and objectives. Dialogue, including question, suggestion and encouragement is therefore, of crucial importance.

In the field of environmental protection India is still battling to provide the basic environmental

needs like safe drinking water and to control the environmental factors which forms links in the chain of transmission of diseases like cholera, typhoid and malarias. While still attempting to overcome these problem of microbiological pollution, India has started also encountering the problems of micro chemical pollution already faced by industrialised countries on account of the drastic steps being taken in the fields of agriculture and industrialization to achieve an early self sufficiency, the environment is undergoing rapid changes within a short span of time. The deleterious side effects of environmental additions, depletion and alterations not only effect the limited natural resources and increase the pollution of water, air and soil but also reduce the aesthetic quality of 'virgin nature' - once a pride of the country.

While the environmental problems get aggravated through exploding population and high rate of urbanization, they are, at the same time, nurtured by the indifference of the individual and negligence of the society. The lack of concern for the environment is mostly due to the individuals ignorance of man's ability to preserve or destroy the environment and his lack of

concern for the environment is mostly due to the individuals ignorance of man's ability to preserve or destroy the environment and his lack of understanding the ecology of the environment. As every segment of population is involved in environmental protection, it is vital that all become not only environmentally 'literate' but also environmentally 'oriented'. A strategic approach to this goal is imparting environmental education at all levels, specially in schools. The learning characteristics of school children is also supported by Piagetian research* that children aged 7 - 11 are at the development stage of 'concrete operations ' when they learn more readily and more efficiently from the real and the concrete than informal abstract or academic modes. Therefore, the primary school classroom should be a prepared environment which is stimulating and rich in resources such as books equipment, pictures, displays and charts. It is particularly necessary that these resources should be used both in the preparatory or briefing stage, so that learners acquire a sound conceptional frame work

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Quoted in "Articles of Educational Interest" by George Cullings. Published by British Council, New Delhi.

for their outdoor investigations, and in the followup stage in the library resource centre.

The environment outside the school remains potentially significant for educational purposes because it is the place where the students live and they should learn to understand it, and to relate it to surrounding areas. The student who lives in an inner city area, for example, should know by the ageof 11 about local bus and train routes, traffic flows, the raw materials used in local factories and their origin, the marketing of local products the shops and markets, the age and history of old buildings and the various types of employment that are available. The environment of the child is the central resource area for his study of geography, history, science, art, english and mathematics. Environmental studies presents to the child real problems for identification, and the resources for their solution. It is here the studies become most naturally integrated and where children can most easily gain both interest in and conceptional understanding of, their world, by genuine learning through first hand experience.

The teachers should identify objects outside the classroom which may be usually brought inside for study. They should set a series of questions or problems the answers to which may only be found by exploring the local environment. This will provide a useful information to the assignment card system. The teachers' attitude, therefore, has to be reoriented so that he can appraise the educational potential of the environment and can regard it as his primary resource.

The classroom can be seen to relate to its social and physical context, to local life and work patterns, and to the business of living, while the children are well motivated and develop a firm understanding of these concepts which provide a foundation for the more systematic study of disciplines appropriate to the secondary stage of education.

Besides the inferences drawn as above from the analysis of data collected from different parts of the state of Rajasthan, it is evident that the present syllabus -

(i) is not environmentally oriented,

(ii) lacks in the field studies which is very

necessary for making the learning of science a meaningful process.

(iii) doesnot contain information about ecological imbalances.

(iv) does not contain informations about the protection of fauna and flora.

(v) does not include topics like conservation of resources, pollution of water and air.

(vi) is silent on topics like preservation of wild life.

(vii) is not interesting and motivating.

(viii) needs proper articulation.

(ix) needs and deserves systematic and psychological changes suited to the present day studies on environment.

(x) does not have relevence to real life.

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RECOMMENDATIONS – VII

In the light of the foregoing study and subsequent data collection and data analysis and the inferences drawn the following recommendations can conveniently be made in order to achieve the aims of science education at the elementary level (upper primary stage).

The Science curriculum should be -

1. Relevent to real life and work experiences of the learners, in particular to the changes taking place in these areas.
2. Significant to the fulfilment of the needs of the learners as individuals or as members of a family and community.
3. Feasible in terms of maturity of the young ones and the availability of resources required.
4. Consistent with new knowledge.
5. Functional for all the children at the elementary level in terms of national developmental efforts to improve the quality of life of the people in such realism as promotion of health and nutrition, conservation of

energy, efficient use of resources, protection from pollution etc.

6. Such so as to contribute to the development of creativity, s~~i~~cientific thinking, scientific attitudes, problem solving skills.

7. Able to development of the aquisition of scientific concepts, principles and processes.

8. Related to the environment of the learners, particularly to the changes taking place in their immediate surroundings, social and natural.

9. Such which may develop the ability, interest and confidence of the students to prepare them to continue learning on their own and to apply the new knowledge to improve the quality of life and adjust intelligently with the environment.

10. Harmoniously related and rationally relevant to other areas and subject contents of the curriculum.

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GENERAL SCIENCE SYLLABUS

CLASS I

UNIT I UNIVERSE

1. We observe the Sun, Moon and Stars in the sky
   - (a) The Sun is seen during the day.
   - (b) It appears round.
   - (c) We feel warm in the Sun.
   - (d) The stars are seen ~~in~~ at night.
   - (e) The Moon is seen at night and attimes during the day also.

2. Position of the Sun in the sky.
   - (a) The Sun rises everyday in the same direction (East).
   - (b) The Sun sets everyday in the same direction (West).
   - (c) The Sun rises day begins and sun sets night begins.

3. Moon and its appearance from day to day.
   - (a) Full Moon - it moves across the sky from Eastern horizon to Western horizon.
   - (b) New Moon - It is seen in the West for a short duration.
   - (c) The interesting phases - it waxes and waves in shape.

4. The Sun, Moon & Stars appear small as they are far away.
   - (a) An object appears smaller at a distance.
   - (b) They are bigger than what they appear.
   - (c) They appear small as they are far off.

CLASS II

UNIT I UNIVERSE

1. The Sun, a source of heat and light.

(a) Days are hot and bright.

(b) Nights are cool and Dark.

(c) The sun illuminates and warms the objects.

(d) Our Moon shines by the light of the Sun.

(e) It is our chief source of light and heat.

2. Besides the Sun there are other sources of light also.

(a) Like the Sun. Stars are also natural source of light.

(b) Moon simply reflects light of the Sun.

(c) Some living things like fire - fly produces its own light.

(d) We get light from several sources :

(i) Candle, (ii) Kerosene Lamp (iii) Electric bulb.

3. When light is obstructed, shadows are formed.

(a) Shadows are formed opposite to the side of the source of light.

(b) The size of a shadow changes with the position of the sun.

CLASS III

UNIT I UNIVERSE

1. The Earth -

i) The surface of the earth is not even.

(a) There are hills and valleys, plains and plateaus on the surface of the earth.

(b) The entire surface is not made up of land.

(c) A large part of the surface is covered with water.

ii) The earth is almost round.

(a) The photographs of the earth taken from satellite show the earth to be round.

(b) The shadow of the earth on the moon at the time of the lunar eclipse is round.

(c) It appears flat (and not round) because of its large size.

(d) All other stars and planets in the night appear round.

iii) The earth rotates about its axis.

(a) Every part of the earth receives light of the sun.

(b) Days and nights are caused by rotation.

(c) The daily movement of the sun across the sky is due to rotation of the earth.

(d) The daily movement of the moon and stars across the sky as due to the rotation of the earth.

2. The Moon -

   i) The moon shows phases -

      (a) The illuminated part of the moon changes from day to day.

      (b) The changes in the shape of the illuminated part are known as phases.

      (c) In the first half of the month (according to Hindi calender) the illuminated part decreases and in the second half it increases.

      (d) The moon is round in shape.

      (e) The moon is a cold body and smaller than earth.

      (f) It reflects light from the sun.

. The Sun -

   i) It is an enormously big hot body.

      (a) The surface of the sun is hot.

      (b) It gives us heat and light.

      (c) The interior of the sun is much hotter.

      (d) The sun is at a large distance from us.

      (e) The sun appears small because of its distance.

      (f) The sun is much bigger than the earth.

Cont....

CLASS IV

UNIT I UNIVERSE

1. Stars :-

i) There are billions of billions of stars in the sky

(a) Stars can be seen in the sky at night.

(b) Stars are present in the sky also in the day th~~r~~ough not visible in day.

(c) In the day stars are not seen because of the glare of sun light.

(d) Stars may be seen during the day at the time of total Solar eclipse.

(e) Some stars are bright, some are faint.

(f) Every star emits light.

(g) Stars appear as points because of their large distances from the earth.

(h) Mostly the stars are much bigger than the sun.

(i) A shooting star is not a star but a meteorite.

ii) The Sun :-

The Sun is one of the Stars

(a) The Sun is far away but compared to the stars it is very near to us, its distance from the earth is 150 millions K.M.

(b) The Sun appears bigger than other stars because of its nearness.

(c) The Sun sustains life on the earth.

iii) The Earth :-

(i) Our earth revolves round the Sun -

(a) The Earth rotates about its axis.

(b) The Earth also moves round the sun in a fixed orbit.

(c) The shape of the orbit is almost circular.

(d) The time for one complete revolution is a year.

CLASS V

UNIT I UNIVERSE

1. The Moon is nearest celestial neighbour in the space :-

(a) The Moon is round with diameter nearly 3000 K.M. (Compared with earth diameter).

(b) Its surface is not even. It abounds in craters.
Their size varies.
There are many mountain ranges.

(c) The distance of moon from the earth is 384000 K.M.

2. Moon revolves round the earth in a fixed time :-

(a) It revolves round the earth in about 29½ days.

(b) It is the satellite of the earth.

(c) We see only one face of the Moon - the other face keeps always hidden, because the time for its revolution is equal to the time it completes one rotation.

3. Moon is calm :-

   (a) Moon has no atmosphere. So its temperature varies greatly in day and night.

   (b) Moon has no water - there are no clouds. It has no weather.

   (c) Moon is believed to have no life.

   (d) Moon is not a source of heat and light. It shines by the reflected light of the sun.

   (e) Moon has no magnetic field of its own like the earth.

   (f) Bodies weigh less on the moon than on the earth.

   (g) Bodies fall at much slower speed on the surface of the moon as compared to that of the earth.

4. Man has been able to photograph the hidden face and also he has been able to land space crafts on its surface :- Neal Armstrong of America was the first man to land on the moon.

   (a) The space rockets carrying photographic equipment have relayed pictures of the hidden face of the moon to the earth.

   (b) Recently " soft landing " has been achieved.

   (c) Through modern operations much new information has been acquired.

5. The Moon revolves round the Earth :-

   (a) The gravitation of the Earth keeps the moon in its orbit.

CLASS VI

UNIT I UNIVERSE

1. The Sun with its family of plants orbiting it is called Solar System :-
    - (a) A number of heavenly bodies revolve round the sun ; these bodies shine by the reflected light of the Sun. They are called planets.
    - (b) So far we have been able to discover nine planets with varying sizes.
    - (c) They revolve at different distances, in different orbits (tables to be given in teachers guide book).
    - (d) Because planets move with different speeds from that of the Earth they keep getting into different positions in the sky.

2. Some of the planets can be seen by the naked eye :-
    - (a) All planets cannot be seen by our eyes on account of their distances and smallness.
    - (b) Planets, Mercury, Venus, Mars, Jupiter and Saturn are seen in the sky if a search is made at the proper place at the right time.

3. All planets move round the Sun in the same direction :-
    - (a) All planets revolve round the Sun in the same direction i.e. counter clockwise or west to east.
    - (b) The Earth spins about its axis from west to east and so all the heavenly bodies appear to travel from east to west in the sky.

4. The solar system has vast extension :-
   (a) The vastness of the solar system could be judged from the fact that if the earth were put at a distance of one metre from the sun the farthest planet should be nearly 60 metres away.

5. The planets move in elliptical orbits :-
   (a) Orbits of planets are elliptical, with the Sun at one of the foci.

6. The farther the planet the slower is the speed of its movement round the Sun :-
   (a) Distant planets go at slower speeds with distances increasing from the Sun.
   (b) Mercury which is nearest to the Sun moves at the fastest speed.
   (c) The Sun controls the movements of the planets on account of gravitational force exerted by it.

7. Physical conditions vary from planet to planet :-
   (a) The physical conditions on a planet depends upon its distance from the Sun and also its size.

8. Planets are different from stars :-
   (a) Planets shine with the reflected light of the Sun.
   (b) They are the members of the solar system.
   (c) The relative distances between stars always remain the same whereas in the case of planets the relative positions with respect to stars changes.
   (d) Stars usually appear to Twinkle, but planets do not.

CLASS VII

UNIT I UNIVERSE

1. There are number of small bodies between the orbits of Mars and Jupitar - called Astroid -

   (a) A number of heavenly bodies have been discovered between Mars and Jupiter.

   (b) They range in size from a few hundred miles to fraction of a mile in diameter.

   (c) They revolve round the Sun, They are called planetoids or Astroids.

   (d) Total mass of the planetoids is much less than that of the Earth.

2. Comets are the most unusual members of the Solar system :-

   (a) Comets are seen across the sky and are easily recognised by their long tails.

   (b) A comet could be seen on successive nights for weeks.

   (c) They revolve round the sun in elongated orbits.

   (d) The comets are of enormous size. The head part may be about 80,000 miles and tail might extend over millions of miles.

   (e) They are composed of tiny particles or bodies.

   (f) The tail grows in size and gets brighter as the comet draws nearer the Sun.
   How tails are formed and disappear.

   (g) The tail always points opposite to the Sun.

   (h) They are not considered as regular members of the solar system.

(i) A comet is only visible when it is nearer comets and swarm of particles (Meteors) if they get too close to the Sun or to a planet.

(j) A comet called Halley's comet appeared in March 1759 . It has appeared since then twice. It will be seen again in 1984.

3. What are commonly (and erroneously of course) called shooting stars are Meteors or meteorites Meteorites :-

(a) Meteors are stones of different sizes or pebbles, orhiting in the solar system, about the Sun or elsewhere.

(b) Some meteors weigh several tons.

(c) They are invisible until they enter earth's atmosphere. When they become incandolascent as a result of frictional heat.

(d) The term meteorite refers to the solid object that hits Earth's surface or any other heavenly body.

(e) On becoming hot a meteor vaporises or may disintegrate into various sizes. Some of them reach the earth's surface in the form of showers.

(f) Millions of meteorites are received by the earth everyday, but a larger meteorite falls once a while only.

(g) Meteorite may be stony or metallic. The former is composed of igneous rocks and later consist largely of iron with some nickle.

(h) Meteorite form a subject of interesting study as they reveal the composition of material of which planets or other heavenly bodies may be composed of.

4. The Sun itself moves in space with its family :-

(a) Sun is fixed only relative to the planets.

(b) There are many such solar systems in the universe.

5. Our Solar system is a part of a larger stellar system called Galaxy (Milky - way):-

(a) Our Solar system belongs to a vast system of stars called the Milky way. It appears as a hazy stream in the sky at night. It has difinite size.

(b) The Milky-way with all its stellar members is a Galaxy.

(c) The Milky - way is composed of billions of stars.

(d) The entire Solar system is just a faint point in the system.

6. The Milky-way haw vast size :-

(a) The size of the Milky-way on account of its vastness is measured in light years.

(b) A light year is the distance light would cover in one year travelling at the rate of 186,000 miles per sec or 3×10^5 K.M./sec.

(c) The Milky-way extends more than 10^5 light years from end to end.

(d) The distance of the solar system from the centre is about 35,000 light years.

CLASS I

UNIT II - LIVING THINGS

1. In our environment we have a few familiar animals such as dog, cow, buffalo, goat, horse, camel, crow, pigeon, house sparrow, mouse, peacock, parrot, cat, butterfly, housefly, bee, fish, frogs and snakes):-
   (a) Various animals differ in their external characteristics.
      (i) size (ii) colour (iii) shape and (iv) built.
   (b) Different animals have different food habits.
   (c) Living habits vary from animal to animal.
   (d) Animals need - air, water and food.
   (e) Animals move about.

2. Plants are present around us :-
   (a) Size and shape vary from plant to plant.
   (b) Plants grow well in sunlight.
   (c) Plants grow in various places.
   (d) Parts of the plant are Root, stem, leaves, branches, flowers and fruits.
   (e) Plants are useful to us -
      (i) They give us flowers, fruits, vegetables, etc.
      (ii) They are eaten by cattle as food.
      (iii) They decorate our gardens.
   (f) Usually plants are green.
   (g) Size and shape of plants and trees varies from region to region.

CLASS II

UNIT II - LIVING THINGS

1. Some domestic animals are useful to us in various ways:-
   (a) Cows, the buffalos and the goats give milk.
   (b) Hen give eggs.

(c) Some animals are used as food.

(d) Sheep give wool.

(e) Hidge , skins and bones of some animals are used.

(f) Oxen, horses, camels and baffaloes are used for farming and transport.

(g) Dog watches homes and fields.

(h) Cat keeps away the mice.

(i) Animal excreta is used as manure.

2. In some respects the animals are alike and in others they are different :-

(a) Animals generally move about -
  - (i) Some move on land.
  - (ii) Some animal swim in water.
  - (iii) Some animals fly in air.

(b) Animals have different habitats.
  - (i) Some live on land.
  - (ii) Some live in water.
  - (iii) Some live on trees.

(c) Some animals can be recognised by the characteristic sound they produce.

(d) Animals reproduce.

3. In forest and jungle several wild animals and birds are found :-

(Tiger, Elephant, Deer, Jackal, Parrot, Peacock and many types of birds)

(a) They have special external characteristics in their -
  - (i) Size
  - (ii) Shape
  - (iii) Food habits.
  - (iv) Shelter.

5. All

4. Different plants are found around us :-

   (a) The common plants are Mango, Neem, Banyan, Babool Guawa, Ber pipal (local names be given).

   (b) They differ in size and shapes of stem, leaves, branches and fruits.

   (c) Plants are useful in many ways.

      (i) Some give us fruits and flowers.
      (ii) Some are source of food material.
      (iii) Some give us protection from the Sun and rains.

5. Plants are living things :-

   (a) Plants are living things just like animals ; they need air, food and water ; they grow and reproduce.
   (b) They need care.

CLASS III

UNIT II - LIVING THINGS

1. There are two broad categories of things - living and non-living things :-

   (a) Men, animals and plants are living things.

   (b) Stones ; Houses, Books, Clothes etc. are examples of non-living things.

2. Living things differ from non-living things :-

   (a) Living things exhibit movements.
   (b) Living things take food.
   (c) Living things respire.
   (d) Living things reproduce.
   (e) Living things respond to stimuli.
   (f) Living things take birth, grow and die.

3. Green plants prepare their own food and also food for animals :-

   (a) In sun light plants make their food from simple substances.

   (b) Mostly animals depend for their food on plants.

4. Generally plants do not move about by themselves but animals move about :-

   (a) Plants remain fixed in their own places.

   (b) Animals move in search of food and shelter.

5. All animal need food to live :-

   (a) Animals need food for -
      (i) Body building.
      (ii) Keeping body fit.
      (iii) Getting energy to do work.

6. Different animals eat different types of food according to their habit :-

   (a) Some animals eat vegetables only.
   (b) Some animals eat flesh only.
   (c) Some eat both.

7. Birds show certain pecularities :-
   (a) Birds fly ; with the help of wings.
   (b) The beaks and claws of birds are suited to their, catching and eating food habits.

   (c) Aquatic birds swim because of webbed feet.
   (d) Most birds build nests for shelter and to lay eggs and take care of the young ones.

   (e) Feathers of some birds are very colourful.

   (f) Some birds migrate over large distances.
   (g) Some birds do a lot of damage to agriculture.

Plant life :-

1. Different parts of the plants have different functions :-

   (a) The roots of the plants are generally under the soil. They hold the plant in position and they obtain water and mineral salts from the soil for the plants for their growth.

   (b) Roots are of different kinds ; tap roots and adventitious roots.

   (c) Stem is the part of the plant that bears buds, shoots and leaves and flowers. Water and mineral salts in solution pass through the stem to different parts of the plant. Some stems grow above and some below the ground.

   (d) The green leaves prepare food with water and minerals from the soil and CO_2 from the air in the presence of sun light.

   (e) Leave change colour from green to yellow.

   (f) Many plants bear flowers which give rize to fruits and seeds.

Cont....

CLASS IV

UNIT II - LIVING THINGS

(A) Animal life :-

1. Animals reproduce their own kinds :-
   - (a) Some animals give birth to young ones, while others lay eggs.
2. Some animals care for their young ones while others do not :-
   - (a, In some animals the mother suckles the young ones.
   - (b) Birds feed and tend their young ones till they learn to fly.
   - (c) Mostly fish, frogs and reptiles do not care for their young ones.

(B) Plant Life :-

1. Plant living in different environment show special characteristics according to their environment :-
   - (a) Some plants live on land and some in water.
   - (b) Plants living in hot and humid climate show different characteristics.
   - (c) Plants of arid region usually have small, spine, thick leaves to conserve water.
   - (d) Plants living in water show spongy nature of the stem ; dissected or broad floating, leaves.
2. Certain condition are necessary for normal growth of a plant :-
   - (a) They must have sufficient air.
   - (b) They must have adequate and regulated water supply.
   - (c) They must get sufficient sun light.
   - (d) They need proper temperature.
   - (e) they need proper soil.

3. Plants are grown in various ways :-

    (a) Some plants are grown from seeds.
    (b) Some plants can be grown from roots, stems and leaves.

4. Plant is a prime source of food :-

    (a) Some plants produce cereals and some yield pulses.
    (b) Some plants give seed from which oil is extracted.
    (c) Some plants produce edible fruits and seeds.
    (d) Sugar and 'Gur' is prepared for juice of of sugar cane.
    (e) Some plants produce edible leaves.
    (g) Stems of some plants are edible.
    (h) Roots of some plants are also edible.
    (i) Plants are used as fooder by animals.

5. Besides being prime source of food, plants have other uses as well :-

    (a) Plants yield cotton, timbers, resins, dyes, rubber, jute etc.
    (b) Certain plants are used in medicines and paper making etc.

6. Different crops grow at different times of the year :-

    (a) There are two important crops :-
        (i) Kharif - Maize, Jawar, Bazra, Cotton, Pulses, Rice, Ground nut 'Til'.
        (ii) Rabi - Wheat, Barley, Gram, Sugar cane 'Sarson'.

7. Different types of vegetables and fruits grow during different seasons -

    (a) Mangoes, oranges, Banana, 'Anar', Lemons, Guavava

'Kakri' 'Matira', 'Kashiphal' etc. grow in summar.

(b) 'Ber', Peaches, Grapes etc., grow in winter 'pea' cauliflower, cabbage, carrot, raddish, potato, brinjals etc. also grow in winter.

CLASS V

UNIT II - LIVING THINGS

1. The body of all living organisms is made up of large number of small units called cells :-

(a) A cell is microscopic in size.

(b) Our body consists of million and millions of cells.

(c) A cell is made up of protoplasm which is -

  i) Transparent.
  ii) Colourless.
  iii) Honey like, in consistency.
  iv) It is present in all living organism and forms of fundamental staff of life.

. Some organisms are unicellular and some are multi-cellular :-

(a) One of the simplest living unicellular organism is amoeba.

(b) All the life processes in Amoeba are performed single cell.

(c) Many living organisms are multi-cellular.

(d) In multicellular organisms all cells are not alike.

(e) Different types of cells discharge different functions.

(B) Animal life :-

1. Different animals put their limbs to various uses :-
   - (a) Man uses forelimbs (hands) in catching and holding and hind-limbs (legs) for walking.
   - (b) Monkeys use forelimbs for catching and holding as well as for walking, and hind limbs for walking only.
   - (c) Quadrupeds use both the fore and hind limbs for walking.
   - (d) Birds use forelimbs (wings) for flying and hind limbs for walking.
   - (e) Snakes have no limbs but crawl along the ground.
   - (f) Fish have no limbs but have fins to swim.
2. Different animals possess different types of breathing organs :-
   - (a) Animals like mammals, birds and lizards beathes by lungs.
   - (b) A Frog breathes through itsskin besides lungs.
   - (c) A fish breathes through gills.
   - (d) An insects breath through air tubes remifying in its body.
3. Animals have special organs which they use to obtain their food :-
   - (a) A butterfly has a long tube to suck food.
   - (b) A Frog has a bifid slimy tongue.
   - (c) A Crane has a long beak to catch fish.
   - (d) A Woodpecker has a strong pointed beak to catch insects from the tree trunks.

(e) An eagle has strong claws to catch mice and small animals.

(f) A Crab also has strong and peculiar type of claws to catch their vistims.

4. Insects are also the members of the animal kingdom :-

(a) Insects form a class of animals by themselves.

(b) Insects by far make up the largest class.

(c) Insect population exceeds man - population on the Earth by a factor which is very large.

5. Some insects are very helpful to us and some of them prove very damaging :-

(a) Some insects are helpful in many ways they eat harmful insects, act as scavengers and produce useful things and help in polination.

(b) Some insects are harmful ; they bite or pierce and act as carriers of various diseases and spread infection. Some insects destroy crops causing great damage. Some insects and moths cause harm to property.

7. Harmful insects are destroyed in various ways :-

Harmful in-sects are destroyed -

(a) By controlling the factors which help in the growth of the insects.

(b) By using chemicals.

(c) By introducing natural enemies.

8. Bee is a kind of insect which is helpful to man :-

(a) Bees live in colonies - they are social insect.

(b) Bees have two pairs of thin wings.

(c) They use mouth parts for sucking.

(d) In a colony there exist three classes of them - queen, drones and the workers. They have different life spans.

(e) Each class has its assigned function or role in the colony.

(f) From their size, shape and living habits each class is easily distinguished.

(g) We get wax, honey from a Bee - Hive.

(h) Bees are very hard working possess regular habits and are highly disciplined.

(i) Bees communicate by peculiar gestures movements.

(C) Plant Life :-

1. Plants, bearing flowers, produce seeds :-

(a) A seed of a plant has the ability to produce a plant of the same kind which produced it.

(b) Some plants give flowers which produce seeds.

(c) All seeds have three parts -

  (i) A seed coat in the form of covering.
  (ii) Embryo.
  (iii) Cotyledons.

(d) A plant produces many seeds.

(e) There are many plants which do not bear flowers and hence they have no seeds.

2. Germination of seeds leads to the growth of new plants :-

(a) Germination is the process by which a seed

develops into a plant.

(b) Certain conditions are essential for germination.

(i) Water. (ii) Air and (iii) Warmth.

3. Dispersal of seeds is necessary for the continuation of the species :-

(a) Dispersal of seeds, help in distribution and growth.

(b) Agencies responsible for dispersal of seeds are

(i) Wind (ii) Water (iii) Movement of insects.

(iv) Movement of animals and (v) Spontaneous cracking.

CLASS VI

UNIT II - LIVING THINGS (PLANTS & ANIMALS)

1. Plants generally occur as :-

(a) Herbs,

(b) Shurbs,

(c) Trees,

(d) Climbers.

(a) (i) Herbs are soft plants which generally grow upto the height of 3 feet.

(ii) They are mostly annuals.

(b) Shurbs are bushy that grow upto the height of 6 to 8 ft. They may be bi or pri-animals.

(c) Trees are strong with prominent main stem, generally go beyond the height of 12 feet.

(d) Climbers need support to climb.

(i) Their stem is generally weak and green.
(ii) They may be annuals or pri-annuals.

2. Plants have different parts which perform different functions :-

(a) The various parts of a plant are -
(i) root (ii) stem (iii) Leaves and
(iv) Flower and fruits.

(b) Roots are generally used for fixing and absorbing raw materials from the soil.

(c) Stem is the arial part of the plant which conducts liquids and bear foliage. Some stems are also underground.

(d) Leaves manufacture and store food and transpire.

(e) Flowers are of various shapes and colours and produce fruits and seeds.

3. Roots have definite characters by which they can distinguished fromthe other parts of the plants :-

(a) Root has no buds.

(b) Root grows down wards.

(c) Nodes and inter nodes are absent.

(d) Root bears a root cap and root hairs.

(e) Roots are generally non-green.

4. Roots are of different types :-
   - (a) There are two types of roots -
     - (i) Tap roots (ii) Adventatious roots.

5. Root performs several functions :-
   - (a) Roots anchor the plant.
   - (b) Roots absorb water and mineral salts from the soil.
   - (c) Some roots accumulates food (raddish, carrot, beet etc).
   - (d) Some roots provide mechanical support (Maize, Banyan, sugar cane etc.).
   - (e) Roots of the parasitic plants suck prepared food from their hosts (cuscuta).

6. Stems have definite characters :-
   - (a) They grow upwards.
   - (b) They grow towards sunlight.
   - (c) Buds and leaves are present on them.
   - (d) Nodes and internodes are present.

7. Stemps have many functions to perform :-
   - (a) Stem supports branches and bears leaves :
   - (b) Transport materials in the plant.
   - (c) It stores food as in Rhizome, potato etc.
   - (d) Some stems help in vegetative propagation (Sugarance, potato etc.).

8. A typical leaf consists of various parts :-

(a) A typical leaf consists of -

(i) Leaf base, (ii) Petiole (iii) Leaf blade (Lamina) (iv) Mid rib (v) Leaf apex

(vi) Leaf margin

(To be written in simple form)

9. Leaves perform various functions :-

(a) Leaves carry on -

(i) Photosynthesis,
(ii) Transpiration.
(iii) Respiration (as well).

Some leaves -

(i) Stores food material.
(ii) Carry on vegetable propogation.

10. Leaves are of two types :-

(a) Simple leaf has -
(i) Single lamina, bud in the axis.

(ii) One mid rib present.

(b) Compound leaf has -
(i) Lamina dissected into many leaflets.

(ii) No bud in the axis of each leaflet.
(iii) More than one mid rib present.

11. A typical flower has several parts :-

(a) A flower consists of -

(i) Pedicel)
(ii) Thalamus) To be written in simple
(iii) Sepals) form.
(iv) Petals)
(v) Stamens)
(vi) Pistil)

12. Different parts of the flower have different functions :-
  (a) Flower is the reproductive organ of the plant -
    (i) Sepals give protection to internal parts.
    (ii) Petals serve to attract insects.
    (iii) Stamens produce pollens.
    (iv) Pistil contains ovules, which develop into seeds.

Animal life :-

1. Animals are grouped according to their habitats :-
  (a) Animals living in water - aquatic.
  (b) Animals living on land - terrestrial.
  (c) Animals living on land and water - Amphibians.
  (d) Animals leading an Aerial life.

2. Different groups of Animals have specialised characters :-
  (A) Aquatic animals - Fish -
    (i) The body parts of the fish are adapted for its aquatic made of life.
      (a) Fish is a typical aquatic animal.
      (b) It body is streamlined.
      (c) It has Gills for breathing.
      (d) It has fins for movements.
  (B) Frog is a typical Amphibian :-
    (a) It uses limbs for leaping on land and swimming in water.
    (b) It respires by gills when young and skin and lungs in the adult stage.
    (c) It lays eggs in water.
  (C) Dog is a typical terristerial animal :-
    (a) It moves on its limbs,
    (b) It respires by lungs.
  (D) A bird is a typical example of air dwellers :-
    (a) They have wings to fly.
    (b) They have feathers on their body.
    (c) They have steam line body.
    (d) Their bones are light.
    (e) Hind legs well adapted to hold the body while the animal is at rest (Pearching mechanism).
    (f) Most of them prepare nest for their living.
    (g) They have beaks.

CLASS VII

UNIT II - LIVING THINGS - ANIMALS

1. The animals are classified into two broad categories :-

   The two categories are -

   (a) Non chordata - having no notochord.

   (b) Chordata - having notochord.

2. Among the Invertebrates some are interesting in various ways :-

   (a) Malercal parasite is interesting because of its - relation to man.

   (b) Corals are interesting because of their beautiful appearance.

   (c) Flat worms and rounds worms one parosites on man and animals e.g. Tape worm, Ascaris, Guinea worm.

   (d) Earthworm is useful in Agriculture. Leech is a parasite on man and animals.

   (e) Butterfly is interesting because of its colourful wings, and as an agent to pollination (short life history to be given).

   (f) Mosquite and House - fly are interesting as disease carriers (brief life history is to be given).

   (g) Pearl oyster is interesting because it gives us pearl, hornets.

3. Among the vertebrates some are interesting in many ways:-

   (a) Fishes - They are interesting because -

      (i) They are very valuable to man as food.
      (ii) The oil from the liver of cod fish and shark is rich in vitamin A and D.
      (iii) Fish meal is prepared for cats, dogs and chickens.

(b) Some persons catch fish for sport and recreation.

(c) Fishes are used for ornamentation purposes i.e. copper fish for aquarium.

(d) Some fishes are interesting because they produce Electric charge for their defence.

(e) The bones and waste parts of the fish are used to make glue.

2. Frogs - They are interesting because :-

(a) They live on land as well as in water.

(b) Their feet are webbed.

(c) They are cold blooded animals.

(d) When winter comes they burry under the mud and remain inactive (Hibernation).

(e) Some of them change colours of their skin, with respect of their environment.

(f) They respire both by lungs and skin.

(g) They lay eggs in water.

(h) Young frog (Tadpole) look diffterent from the adult from, which means change or metamorphosis takes place when tadpole becomes an adult. Tadpoles respire through gills.

3. Lizards - They are interesting because -

(a) They have four legs and some of them can run very quickly.

(b) They have a thick, dry skin covered with scales.

(c) Both young and the adult lizards breathe only through the lungs.

(d) The eggs have a protective shell or membrane around them.

(e) Some Lizards, like Draco can fly as hence are called - flying lizards.

(f) They are non-poisonous.

(g) Some of them have pre-hensile tail for balancing as chameleon. (It can also change colour).

4. Birds are interesting because :-

(a) They are very light, skeleton of porous or hollow bones.

(b) Some birds (game birds) such as quail, grouse, duck wild goose, turkey are used asf food.

(c) The eggs of the chicken and ducks are used as food.

(d) Pigeon, Parrat, bulbuil; etc are kept as pets.

(e) Feathers are used for decoration.

(f) Some birds have sweet voice.

  (i) They build nests to provide a place of incubation and hatching their eggs and for protecting the young ones.

  (ii) Some birds build beautiful nests of different materials.

5. Mammals are interesting because :-

(a) They have hairs on their bodies.

(b) They care for their young after birth and nurse them by giving them milk that comes from special glands called mammary glands of females.

(c) They differ in sizes - some mice and shrews are about 2 inches long and weight less than one once. While the largest mammal is the blue whole, which can be more than 100 feet long and weight more than 150 tons.

(d) They have lungs to breath.

(e) Some mammals as duck - billed platy-pus Echidna (Spiny ant eater) lay eggs instead of giving birth to the young ones.

(f) Some have pouch to keep the babies for feeding, Kangroo.

(g) The Elephant is the only trunk - nosed animal alive today.

(h) Some mammals can fly e.g. bats.

(i) Some mammals are useful to man as they -

  (i) Supply food and other eatables.
  (ii) Supply us wool and skin.
  (iii) Some are beast of burden.

(j) Some mammals are harmful to man as they -

  (i) Destroy crops.
  (ii) Spread diseases.
  (iii) Use man as food (lion, tiger).

Plant Life :-

Pollination and fertilization :-

1. Pollination and Fertilization are the essential processes for the formation of seeds :-

(a) Pollination is the process by which pollen grains are transferred from Anthers to stigma.

(b) Fertilization is the fusion of Pollen with egg cell in ovule.

(c) Pollination leads to fertilization.

2. Pollination is of two types - Self pollination and cross pollination :-

The various agencies of pollination are -

(i) Air,

(ii) Water.

(iii) Insects,

(iv) Animals.

Fertilization :

1. Fertilization leads to the formation of fruit :

(a) Fertilization is the fusion of Pollen with egg of the ovule which leads to the formation of embryo in seed.

(b) After fertilization of ovule forms the seed and the whole of the ovary is converted into fruit.

Germination of seed :-

1. Seeds consists of various parts :-

(a) Seed consists of (i) Seed-coat and (ii) Embryo.

(b) Embryo consists of radicle, plumule and cotyledons.

2. Seeds are of two types - Monocot and dicots :-

(a) Seeds with two cotyledons are known as dicot e.g. gram, pea, bean, groundnut, mango, tlamnarind,

(b) Those in which two colydens not distinguished are known as monocots e.g. Rice, Maize, Bajra.

3. Seeds germinate and form new plants :-

(a) The radicle gives rise to root system.

(b) The plumule gives rise to stem, leaves, flowers and fruits.

4. Certain conditions are necessary for termination :

(a) The necessary condition are -

(i) Moisture.

(ii) Air (Oxygen).

(iii) Proper temperature.

Plant Life :-

Some interesting and peculiar plants :-

1. There are several types of plants in our environment :-

(a) Some are microscopic as bacteria and diatoms.

(b) Some are small and microscopic in structure whereas others are of huge dimensions.

(c) Some have chlorophyll, some don't have chlorophyll.

(d) Some grow in water, some in damp places, some on land, whereas some even in deserts.

(e) Some grow in hot, some in temperate whereas some grow even in areas mostly covered with snow.

(f) Some are usdful as medicine and have food value while some cause diseases.

Some examples of plants which facinates the Biologists :-

1. Bacteria are of great interest to us :-

(a) They are single cellular and microscopic.

(b) Some cause diseases in man, e.g. T.B., Typhoid Cholera etc. They are also responsible for pus formation.

(c) Some fix nitrogen of the atmosphere, leading a symboitic life with leguminous plants. Thus they enrich the soil and increase its fertility.

(d) Some have industrial uses also, they are useful in manufacture of organic acids and alcohol.

2. 'Toad Stools' or mushrooms are of great interest to us :-

(a) They have attractive colours and shapes. Some have umbrella or dome shaped appearance.

(b) Some are edible others are poisonous.

(c) Edible forms are rich in carbohydrates, fats vitamins and minerals.

(d) Some countries like U.S.A. and Japan have started cultivation of edible mushrooms. They can supplement our food.

4. Poerios (fern) is of great interest tos us :-

(a) It has large showy leaf like structures.

(b) It is grown for decoration purposes, in our gardens.

(c) It grows in damp climates and wet places in colder places.

(d) They have roots, stems and leaves, but they do not have flowers, fruits and seeds.

5. Sunflower is of great interest to us :-

(a) It is among the highest evolved plant, as we have man in animal kingdom.

(b) It has covered seeds (seeds are not naked).

(c) The Sun like " flower " is composed of many tiny florets, disc florets and ray florets. This combination is called as inflorosence.

(d) The seeds are used for extraction of oil.

CLASS I

UNIT III - AIR, WATER AND WEATHER

1. Air is everywhere around us :-
    - (a) We can feel air in action :-
        - (i) by self experience (ii) by observing things move.
    - (b) Air occupies space, air is a material - substance.
    - (c) Air pushes in all directions.

2. Air is necessary for life :-
    - (a) Air helps in kindling.
    - (b) Air is necessary for breathing.
    - (c) Air inflates balloons, footballs, cycle and motor tubes etc.

WATER

3. Water is useful to life :-
    - (a) Water is used for -
        - (i) Drinking.
        - (ii) Cooking.
        - (iii) Bathing and washing.
    - (b) Water is essential for the growth of plants.

4. Water is obtained from various sources :-
    - (a) Rain is a source of water.
    - (b) Liver is a source of water.
    - (c) Well is source of water.
    - (d) Tank is source of water.

5. Water that falls to the Earth as rain disappears in many ways :-
    - (a) A part flows down to rivers or tanks etc.
    - (b) A part evaporates due to heat.
    - (c) A part sinks deeper into the Earth.

6. Some bodies sink in water and some float on it :-
    - (a) Small & heavy bodies usually sink.
    - (b) Large & light bodies float.
    - (c) Some liquids float on water.

WEATHER

7. Changes in weather occur frequently : Sometimes weather is

(i) Dry.	(ii) Moist.	(iii) Hot.	(iv) Cold.
(v) Sunny	(vi) Cloudy	(viii) Calm	(viii) Windy.

CLASS II

UNIT III - AIR, WATER & WEATHER

1. Air is present in all the tiny spaces between particles of various materials :-
    - (a) Air is present in sponge.
    - (b) Air is present in porous substances like sponge, soil, sand, bricks, etc.

2. Air serves in various ways :-
    - (a) Air is necessary for life.
    - (b) Fire needs air to burn.
    - (c) Aeroplanes fly in air.
    - (d) Birds fly in air.

3. Heating and cooling affects air :-

   (a) Air expands on heating.

   (b) Air contracts on cooling.

   (c) Warmer air is lighter and it goes up.

4. Town air is usually impure :-

   (a) Dust and smoke may be present in air as impurity.

   (b) Impure air is harmful because of its being contaminated with dust, sand and smoke.

   (c) Fresh air is necessary for health.

   (d) We get fresh air in playgrounds, fields, gardens, forests and such other open places.

5. Air in motion is wind :-

   (a) Wind has direction.

   (b) Wind may be mild or strong.

   (c) Wind carries dust, sand and smoke.

   (d) Wind helps in kindling of fire.

   (e) Wind helps in drying clothes.

   (f) Wind operates wind - Mills.

6. We should drink only fresh and pure water :-

   (a) Water free from contaminations is fresh

   (b) Water should be filtered before drinking.

   (c) Water Pots containing water should be daily washed and cleaned.

7. Water constantly undergoes a cycle of changes in nature :-

   (a) The sunlight and wind help in changing water into vapours.

(b) The vapours form clouds in the sky.

(c) The clouds bring rains on the earth.

(d) The rain water flows in streams and rivers.

(e) Some rain water goes under ground.

(f) On digging wells we take out the underground water.

3. Many things dissolve in water :-

(a) Ordinary water contains salts dissolved in it.

(b) The taste of water is due to the dissolved salts.

(c) Heating and stiring helps dissolving.

(d) All substances do not dissolve.

(e) When a substance is dissolved we get its solution.

(f) On heating a solution to dryness, the substance is recovered.

CLASS III

UNIT III - AIR, WATER & WEATHER

1. Water exists in three states which are interconvertible :-

(a) Water evaporates into vapour.

(b) Water vapour condenses into water.

(c) Water freeze into ice.

(d) Ice melts into water.

2. Changes in weather are observed frequently :-

(a) Weather changes from day to day and from time to time.

(b) It may change due to sun, wind, clouds and rain.

(c) Weather may change due to wind storms and thunderstrome.

(d) Weather may change due to snow fall and cold wave.

(e) The location of a place has much influence on its weather - conditions.

3. Weather influences us in several ways :-

(a) Outdoor work is difficult in bad weather.

(b) Fine weather is good for sports and picnics.

(c) Foggy and stormy weather reduces visibility and makes the travel risky.

(d) On a hot day we feel hot, on a cold day cold and on a rainy day stuffy.

4. It is possible to forecast weather :-

(a) It is possible to know about weather changes by the movements of birds, insects etc. and some signs in nature.

(b) Weather bulletin is forecast every day by "Akashwani".

(c) By studying physical conditions of the atmosphere (Temp., Pressure, Humidity, wind etc.) it is possible to product weather.

5. Year is marked with three principal seasons :-

(a) In a year there are three seasons.

(b) Seasons are accomanied by changes in crops, trees, mignation of birds, insects etc.

(c) Seasons are caused by the revolution of the Earth about the sun, with its axis inclined.

CLASS IV

UNIT - III AIR, WATER AND WEATHER

1. The Sun plays an important part in causing changes in weather :-

    (a) The sun warms the earth during the day.

    (b) The Sun warms the earth more in summer than in winter because the days are longer in summer and shorter in winter. Also the Sun is more directly overhead in Summer than in winter.

    (c) During the day the land and the air above it gets heated sooner than water and the air above it, causing air to blow from sea to land.

    (d) At night the land and the air above it cools faster than water and the air above it, causing wind from land to sea.

    (e) Difference in temperature in the air of different places causes wind. The greater the difference in temperature the faster will be the wind.

2. Evaporation is influenced by several factors :-

    (a) Water changes into vapour (Steam) when left to itself. It is called evaporation.

    (b) Water evaporates almost all the time making air moist.

    (c) Water evaporates faster when :-

        (i) It is windy.

        (ii) The temperature is high.

        (iii) The exposed surface is large.

        (iv) The air is dry.

(d) Warm air can hold more water vapour than cold air.

3. Like water other liquids too evaporate :-

   (a) Some liquids evaporate faster than others.

   (b) One evaporation a liquid changes into its own vapour.

   (c) Evaporation causes cooling.

4. Cooling changes water vapour into water. This change is called condensation :-

   (a) We meet several instances of condensation in nature -

      (i) Rain is formed when drops of water in the claud grow too large to stay up in the air.

      (ii) Dew is formed when water vapour condenses on cold objects.

      (iii) Frost is formed when water vapour condenses on freezing cold objects.

      (iv) Mist and clouds in the sky or fog on the ground are formed when water vapour condenses on some particles in the air.

      (v) Snow is formed when water vapour freezes on some particles in the air.

   (b) For condensation to take place air must be cooled to a certain temp.

   (c) On the Earth the processes of evaporation and condensation go on continuously in a cycle. It is called "Water cycle ".

5. A liquid boils at a fixed temp, called its B.P. :-

(a) When a liquid is heated, a stage is reached when temp. stays constant and the liquid changes into vapour with bubbles rigorously rising to the surface and escaping into air.

(b) This temp. is called its B.P.

(c) The evaporation is now at maximum rate (at B.P.)

(d) Different liquids have different B.P.'s.

6. Water may contain impurities :-

(a) Suspended impurities in water may be dust, sand etc.

(b) Dissolved impurities in water may be salts, minerals etc.

7. Impurities in water may be removed in several ways :-

(a) Sedimentation , decantation and filtration will remove suspended impurities.

(b) Distillation will remove dissolved impurities.

8. Water is present under ground :-

(a) Water passes through porous material.

(b) Water is stopped by nonporous rocks.

(c) The level of water below the ground may be low or high.

(d) Swamps are formed when the level of water is close to the surface of the ground.

(e) Water may be obtained fro lakes, springs or wells.

CLASS V

UNIT III – AIR, WATER AND WEATHER

AIR

1. We live in air :-
    - (a) Air extends to about 300 KMS. At this height it is very rare.
    - (b) Air acts like a huge blanket. Without air days will be very hot and nights very cold. There would be no rains, life will extinct.
    - (c) Air has weight.
    - (d) Water vapour is lighter than air.
    - (e) Moist air is lighter than dry air.
    - (f) Higher we go air becomes lighter.

2. Air exerts pressure :-
    - (a) When air is pushed into a balloon, it inflates.
    - (b) Air consists of molecules which bombard the wall of the balloon, exerting pressure.
    - (c) Air is highly compressible.
    - (d) Some common phenomenon depend on unbalanced air pressure :-
        - (i) Filling ink in pens.
        - (ii) Rising of oil in stoves.
        - (iii) Compressing of air in the tubes of cycles, motor, cars etc.
        - (iv) Sucking of drinks through straw, etc.
        - (v) Transferring of a liquid by means of siphons.
        - (vi) Lifting of water from wells by pumps.

3. Pressure diminishes with height :-
    - (a) As we go higher up the pressure diminishes.
    - (b) Air pressure on tops of mountains is less than at sea level.
    - (c) It is difficult to breathe at higher attitudes on account of low air pressure.

4. Difference in pressure causes wind.:-
   (a) Air blows from higher pressure to lower pressure.
   (b) During day wind blows from sea to land (land breeze) and at night it blows in the reverse direction (sea breeze).

5. The Direction and speed of the wind usually changes from time to time :-
   (a) The direction of the wind is taken to be the direction from which wind belows.
   (b) The Direction of the wind is indicated by weather cock.
   (c) The speed of the wind can be measured by an instrument.
   (d) Wind blows at different speeds under different situations such as gale, sterm, hurricane, etc.
   (e) Proportion of these constituents may vary from place to place and from time to time.

6. Air is polluted by the presence of dust, smoke, harmful gases etc -
   (a) Smoke rising from Chimneys, dust thrown into air by the movements of bodies, gases given out by exhaust pipes of automobiles all pollute air.
   (b) Polluted air might prove injurious to the health.
   (c) Steps must be taken to prevent air - pollution.

WATER : -

1. Water exerts pressure :-
   (a) Water by itself flows from higher level to lower level of from higher pressure to lower pressure.
   (b) The pressure exerted by water varies with depths.
   (c) The thickness of a dam is large at the bottom.

CLASS VI

UNIT III - AIR, WATER & WEATHER

1. The earth is surrounded by an envelope of air :-
   (a) Man lives in air.
   (b) Air extends upwards for hundred of miles.
   (c) Atmosphere moderates temperature, protects us from harmful rays and particles from outer space.
   (d) Air becomes thinner and thinner at higher levels.
   (e) Almost half of total weight of total air lies within 6 Kilometers from the earth.

2. Air is composed of many gases :-
   (a) Air is a mixture mainly of N_2 & O_2.
   (b) Nitrogen is approximately 4/5 part of air.
   (c) Oxygen is approximately 1/5 part of air used in respiration of animals and plants and combustion of fuel.
   (d) Carbondioxide is only ,03 percent of air.
   (e) Water vapour, is present in air in varying amounts.

3. The sun, air and water play the main 'role' in weather changes :-
   (a) The sun is the leading figure providing heat energy.
   (b) The air is the vehicle that circulates and transports all kinds and conditions of weather around the earth.
   (c) Water appear in many forms as rain, dew, fog, clouds, snow etc.

4. The sun heats different parts of the earth unequally :-
   (a) The suns rays reach about half of the earth at any one time. There is a daily cycle of heating and cooling accompanying day and night.
   (b) The sun shine is not equally strong all over the earth. The areas near the equator receive more

[illegible]tions than farther away from the equator. Therefore equitorial regions receive more heat than the temperate zones and temperate zones more than the polar regions.

(c) The tilted axis of the earth and the yearly revolution of the earth around the sun causes variation in the amount of heat received at different times of the year.

(d) The heat absorbed by different surfaces of the earth is different e.g. water heats up much more slowly than land. Hence it is cooler in Summer at the sea coast, than in inland regions at the same latitude.

(e) The air at the bottom of the atmosphere being denser, dustier and more moist absorbs more of the suns radiations-- than air in the upper layers. At mountain tops the intensity of sun's rays is more. At mountain tops the intensity of sun's rays is more.

5. The unequal heating of the earth by the sun causes winds :-

(a) Heated air expands and becomes lighter.

(b) Cold air being heavier pushes it under the lighter air and forces it up.

(c) Since earth is hottest at the equator and coolest at the poles global wind circulation is set up.

6. Oxygen and moisture present in air are necessary for rusting :-

(a) Iron articles rust usually during rainy season.

(b) Rusting consumes active part of air i.e. oxygen.

(c) Maisture is also needed for rusting.

(d) Iron does not rust in - (i) dry air and (ii) air free water.

(e) Rusting eats away iron and makes it unfit for use.

7. Rusting can be prevented by protecting ironin many ways :-

(a) By a protective coating of paints.
(b) By a protective coating of another metal like zinc, nickel , chromium, lead etc.
(c) By allowing with other metals.
    (i) Steel is an alloy of iron with small quantities of carbon and other metals.
    (ii) Stainless steel contains chromium, manganese and nickel.

CLASS VII

UNIT III - AIR, WATER & WEATHER

- Air is found in the atmosphere in a series of layers

(a) These layers differ from one another in (1) temperature (2) Composition (3) Pressure and (4) Other properties.

(b) Tropospheres :-

i) It is the layer in which we live.

ii) It extends to a height of about 15 Kilometers.

iii) Storms, and other weather phenomena mostly occur in this layer.

iv) There is a steady drop of temperature with altitude.

v) Here sky appears blue on account of the scattering of light by the dust particles.

(c) The stratosphere :-

i) This layer extends from top of the troposphere to a further height of about 30 kilometers from the earth.

ii) This layer is moistureless and coludless.

iii) This layer is extremely cold.

(d) Ozonosphere :-

i) This layer extends from top of the stratosphere to a height of about 80 Km from Earth.

ii) Here the temperature rises to 12°C upto the 50th Km from earth and again falls to nearly 100 degrees below ice point, at the top of ozonosphere.

iii) Oxygen exists in the form of ozone.

vi) Ozone protects us from harmful radiations from the sun.

c) The Ionosphere

i) This layer plays significant role in bringing radio waves from distant parts of the world.

ii) It extends from 80 to 640 Km. from earth's surface.

iii) About temperature variations.

iv) The air is extremely rarified in these regions.

v) It acts as a screen protecting us from the meteorites.

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CLASS I

UNIT IV - HUMAN BODY AND HEALTHY LIVING

1. Healthy habits are important for healthy living :-
   - (a) The healthy habits are cleaning of hands, face, eyes, mouth, nose and teeth, taking bath, trimming nails,; combing hair and wearing clean clothes.
   - (b) Keeping the class room and home clean.
   - (c) Having ones own drinking vessel.
   - (d) Covering the mouth while coughing, sneezing and avoiding spitting in public places.
   - (e) Care during illness.

2. Exercise and rest are necessary for health :-
   - (a) Regular rest habit builds the body.
   - (b) Exercise & play make the body strong.

3. There are certain needs of the boy :-

   The needs are :-

   (a) Air. (b) Water. (c) Food

   (d) Clothing (e) Shelter.

4. Safety measures are necessary to avoid accidents :-
   - (a) Be careful to avoid getting hurt while -
     - (i) walking and moving.
     - (ii) Working and playing.
     - (iii) Bathing and swimming.
     - (iv) Using electrical equipment
       Safety runs for electricity.
     - v) Handling sharp instruments -
       Knife, nails, blades etc.

CLASS II

UNIT IV :- HUMAN BODY AND HEALTHY LIVING

1. Good health is maintained by observing certain rules.
   - (a) Good health is maintained by regular exercise.
   - (b) Keeping correct posture while sitting, standing and walking.
   - (c) Taking nutritive food.
   - (d) Taking proper rest.
2. Good food habits are necessary for healthy living :-
   - (a) Food should be contained in clean and covered utensils.
   - (b) Food should be taken at regular hours.
   - (c) Food should be chewed well.
   - (d) Over eating should be avoided.
   - (e) Spoiled food should not be taken.
   - (f) Sit in a well ventilated and lighted place while eating.
   - (g) Hands and mouth should be washed before and after meals.
3. We must have a nice house to live in -
   - (a) House is a place where we live with other persons of our family. It gives us shelter from Heat, cold and rains.
   - (b) We eat, live and rest in house. It provides comfort.
   - (c) House must be in a healthy locality.
   - (d) House must have fairly big Rooms with doors and windows.

(e) House should admit ample sun light and fresh air.

(f) House should not have many big trees obstructing air and light.

(g) House should not be exposed to dust, etc.

(h) Things should be kept in an orderly way in the house.

(i) Different rooms must be set apart for different purposes.

(j) Kitchen and toilets must be at convenient places.

(k) House must be properly looked after.

CLASS III

UNIT IV - HUMAN BODY AND HEALTHY LIVING

1. Breathing is an essential or vital phenomenon of all living organisms :-

   (a) Organs associated with the breathing process are nose, windpipe and lungs.

   (b) We take in fresh air and breathe out air containing waste.

   (c) We breathe faster when we run or do exercise.

   (d) Air provides oxygen to the body.

2. Proper breathing habits are essential :-

   (a) Breathing must be through the nose.

   (b) Mouth should be closed while breathing.

   (c) Nose to be kept uncovered while in rest or sleep.

   (d) Tight fitting dresses over the chest should be avoided.

3. We make contact with our environment through our sense organs :-

   (a) Eye is an organ of sight.
   (b) Ear is an organ of hearing.
   (c) Nose is an organ for smelling.
   (d) Tongue is an organ of taste.
   (e) Skin is an organ of touch.

4. Many organs are involved in functioning of a particular system :-

   (a) Organs associated with respiration are nose, windpipe and lungs.

   (b) Organs associated with the digestion of food are mouth, gullet, stomach, intenstines, lever and pancreas.

   (c) Organs associated with the circulation of blood are heart and blood vessel.

CLASS IV

UNIT IV - HUMAN BODY AND HEALTHY LIVING

1. Substaining of life depends largely on the continuation of certain vital processes in the body :-

   The vital processes are :-
   i) Digestion of food.
   ii) Breathing
   iii) Circulation of blood.
   iv) Removal of waste products.
   v) Control and co-ordination of life processes.

2. To keep these vital processes going on we need food :-
   (a) Food gives us energy for work.
   (b) Food helps growth of the body.

(c) Food repairs wear and tear of the body parts.

3. For proper utilization of food it has to be digested:-

   (a) Digestion consists in charging food, into soluble form ready for absorption.

   (b) The organs taking part in digestion form digestive system.

   (c) A digestive system consists of the following parts:-
      i) Alimentary canal :-
         (a) Mouth (teeth, Tongue and salivary glands)
         (b) Oesophagus (Food pipe).
         (c) Stomach
         (d) Small in~~s~~testine
         (e) Large intestine.
         (f) Liver
         (g) Panereas.

   (d) Each organ plays its specific role in digestion.

   (e) Digestive juices helps in digestion.

4. Some food articles are eaten in the form they occur in nature while others have to be cooked :-

   (a) Fruits, nuts and some vegetables can be eaten raw - These articles have to be washed.

   (b) Some food articles have to be cooked for eating, e.g. bean, cereals and pulses etc. to make them palatable and digestive.

5. Teeth are useful to man in many ways :-

   (a) Teeth are necessary for tearing, cutting and chewing, the food, so that it may be digested easily.

   (b) Teeth help in speaking clearly.

6. There are various types of teeth :

(a) There are two sets of teeth -
(i) Milk dentation (ii) permanent dentation.

(b) In permanent dentation there are 32 teeth, which are of four types.

(c) The incisore are used for biting or cutting.

(d) The canines are used for tearing food.

(e) The pre molars and molars are used for grinding or masticating food.

(f) Incisors are replaced at seven or eight years of age.

(g) The first permanent molars come at six years of age, the last set, from seventeen to twenty five years of age.

7. Cleaning of teeth is necessary to keep them in healthy conditions :-

(a) Food particles if left sticking to the teeth begin to purify.

(b) The injurious substances formed by this putrefication corrode~~s~~ the teeth and cause cavities.

(c) More food particles stick in the cavities the teeth further decay.

(d) Teeth must be cleaned daily.

(e) Teeth must be cleaned both before and after taking food.

(f) Exercise of the teeth and gums aids in keeping them healthy.

8. Decaying teeth cause disease and pain :-

   (a) Bad teeth give rise to indigestion and stomach troubles.

   (b) Bad teeth give foul smell.

   (c) Decay of teeth leads to teeth ache.

9. Clean and well ventilated houses with good sanitation are needed for healthy living -

   (a) There should be free movement of fresh air in the house.
   (b) House should admit sufficient sun light.
   (c) It should be free from dust and dirt.

   (d) The surroundings should have good sanitation :
      i) Refuse to be removed.
      ii) Water should not be stagnent.
      iii) Cattle should be kept away from the living rooms and their places must be cleaned daily.
      iv) Kitchen should be provided with chimney.
      v) Flies and mosquitoes should be kept away.

10. Wearing of cloth :-

   (a) Clothes protect body from heat, cold, rain and wind.
   (b) Different types of clothes are warm during winter and summer.
   (c) Tight clothes are inconvenient to put on and take off.
   (d) Tight clothes obstruct free movement and hinder proper development of the body.
   (e) Clothes should not be very loose.
   (f) Proper care adds to the life of clothes.

CLASS V

UNIT IV - HUMAN BODY AND HEALTHY LIVING

1. Our body has a skeleton of bones :-

   (a) There are 206 bones in the human body.

   (b) The different bones are the skull, the ribs, the breast bone, backbones, bones of thelimbs etc.

   (c) The bones give

      i) Shape to the body.
      ii) Protection to the internal delicate parts
      iii) Support to the body.
      iv) Attachment to the muscles.
      v) Leverage.

2. Our skeleton has several joints :-

   (a) Joints are of several types performing different functions.

      i) Ball and socket.
      ii) Hinge
      iii) Gliding joints.
      iv) Immovable joints.

3. There are several muscles in our body :-

   (a) There are 400 different muscles in our body making one-half of the body.

   (b) There are two types of muscles-voluntary and involuntary.

   (c) Functions of the muscles is to impart movement to the organs.

4. Food contains six major constituents :-

   (a) The six constituents present in our food are -
      (i) Carbohydrate
      (ii) Proteins
      (iii) Fats
      iv) Mineral salts
      v) Vitamins and
      vi) Water.

   (b) The various constituents have their specific functions.

   (c) The constituents are obtained from various sources.

5. For healthy growth ; balanced diet is necessary :-

   A balanced, diet contains all the six constituents in proper proportion in relation to different age groups (balanced diet for child 9 to 12 years age and average adult) Indian diet be given.

CLASS VI

UNIT IV - HUMAN BODY, HEALTHY AND LIVING

1. Many diseases are caused by Micro-organisms :-

   (a) Micro-organisms are too small to be seen by naked eye. They are germs, bacteria and virus.

   (b) To see these micro-organisms microscope is used.

2. There are many agencies that spread diseases :-

   The agencies are (i) Air (ii) Water (iii) Food (iv) Insects and animal.

3. Diseases can be prevented and controlled in various ways :-

(a) Antiseptics :-

(i) They will germs and check their multiplication.

(ii) Prevent the entry of germs into the wound.

(b) Disinfectants kill germs

(i) Sun rays (ii) Boiling water and steams

(iii) Common chemical disinfectants arelime, Bleaching powder, kerosene oil, $KMnO_4$.

(c) Certain drugs kill bacteria and germ.

(i) Sulpha drugs

(ii) Antibiotics as penicillin, Streptomycin, Chloromycetin etc.

(d) Immunization practices such as inoculation and vaccination prevent the spread of certain diseases.

(i) Inoculations prevent the spread of cholera, typhoid, diphtheria, tetanus etc.

(ii) Vaccination induces immunity against smallpox,

(iii) B.C.G. Vaccine prevent the spread of Tuberculosis.

4. Respiration is the important activity of all living organisms :-

(a) Respiration is the intake of ffesh air and expelling of foul air.

(b) In the process of respiration food is oxidised where by carbon-di-oxide is produced and energy is liberated.

5. Various organs are associated with the respiratory system :-

(a) Respiratory system consists of the following organs

(i) Nostrils (ii) Pharynx (iii) Trachea

(iv) Bronchil (v) Lungs

(b) The air is moved in and out of the lungs by the action of the muscles between the ribs and the diaphragm.

(c) Air enters the body through the nostrils.

(d) The air passes through the wind-pipe and is distributed to the two lungs through the bronchial and bronchial tubes.

(e) The lungs consist of millions of tiny air sacs in which the final branches of the bronchial tubes end.

(f) The walls of the bronchial sacs are covered with a net work of capillaries through whose thin walls, oxygen diffuses from air sacs to blood capillaries and carbon-di-oxide and water vapour pass out from to air sacs of lungs.

(g) With the contraction of the muscles the foul air goes out through the same passage by which it has entered.

6. Blood is composed of various substances :-

(a) Blood is made up of the following :

- (i) Red blood corpuscles
- (ii) White blood corpuscles
- (iii) Thrombocytes
- (iv) Plasma

7. The circulatory system consists of the heart, arteries, veins and blood capillaries :-

(a) The heart is an involuntary muscular organ. It ceaselessly pumps blood to all parts of the body.

(b) Arteries carry blood from the heart to the rest of the body. Their walls are muscular and they contract along with the heart.

(c) The arteries finally branch into fine capillaries which run through the tissues of various organs.

(d) These capillaries unite to form veins which carry blood back from the organs to the heart. Veins have valves which prevent back flow of blood.

(e) The pulmonary artery takes blood from lungs to heart for its circulation.

(f) The circulatory system is a closed system of pipes containing blood.

3. The blood performs many functions :-

(a) Blood transports oxygen, food carbon-di-oxide, hormones and certain waste materials to and from appropriate organs and tissues of the body.

(b) Blood regulates body temperature.

(c) Blood fights microbes enterting the blood stream.

(d) Blood prepares antitoxins to neutralise toxins formed in certain diseases.

(e) Blood forms clots in minor cuts and injuries, preventing further loss of blood.

4. Blood transfusion is done when one loses lot of blood :-

(a) There are four types of blood groups A, B ,AB & O.

(b) For blood transfusion a patient needs a compatible type of blood.

(c) Different types of blood are donated by different individuals.

(d) Only healthy people after medical examination can donate blood, once in three months.

(e) A healthy man can donate half a litre of blood at a time.

(f) The donated blood is stored in hospitals called blood bank.

1. Good house has several important features :

(A) Site - It must be built on a good sight -

- (i) The site must be hard andnot of humus soil.
- (ii) It should not be in a low area.
- (iii) The sub soil water table should be low.
- (iv) It should permit sufficient light and fresh air etc.
- (v) Municipal services of water supply electricity, Transport* should be within reach of the site. *Educational * Medical facilities.
- (vi) It should away from factories and busy places.
- (vii) Direction of the Sun and wind.

(B) Features of good house :-

- (i) House should be built according to a set plan.
- (ii) It should have proper ventilation.
- (iii) The rooms should receive sufficient sunlight.
- (iv) There should be a proper water supply in the house.
- (v) There should be proper drainage.
- (vi) Cattle shed should be away from the residential quarters.
- (vii) There should be some open space left around the house.
- (viii) There should be proper disposal of refuse in the house.
  - (1) Sweepings, vegetable and fruit refuge in the house.
  - (2) Human excretas should be properly disposed of. In cities septic tanks and soak pits are used for disposal of human excretas.

2. Various materials are used in the construction of house :

   (a) The material used is according to the need, its availability, and Geographical conditions.

   (b) The durability of a house depends on the material used -

      (i) Brick and concrete are hard and rigid and can be given any desired shape.

      (ii) Concrete reinforced with iron bars bears greater stress.

      (iii) Mortor sets into hard layer on drying, is used for making surface smooth and water proof.

      (iv) Cement asbestos sheets are light fire proof and good insulators are used for roofing.

      (v) Galvanised iron sheets are light and fire proof are used for roofing.

      (vi) Clay tiles are used in roofing.

      (vii) Wood is light, easily shaped and a good insulator, is used for doors and windows.

      (viii) Glass and plastics admit light, are good insulators and water proof.

CLASS VII

UNIT IV - HUMAN BODY AND HYGIENE

Excretory system :-

1. All living cells produce waste materials, which are excreted through various organs of our body, namely skin, lungs, and the kidney :-

   (a) When food is oxidised in the body cells, carbon-

di-oxide and water are formed, Carbon-di-oxide, as a waste is removed by lungs, during the process of respiration.

(b) Proteins break up into various compounds containing nitrogenous wastes i.e. Urea - which is removed by the Kidney.

(c) Salts and water are excreted by skin.

2. Skin acts as an excretory organ :-

(a) The skin consists of two layers.
(b) The upper layer of the skin is called as Epidermic
(c) The inner layer is called as dermis, which contains pigment cells, nerve endings, sweat glands, oil glands and hair roots.

  (i) The pigment cells give the characteristic colour of the skin.

  (ii) The nerve endings give the sensation of touch, heat, cold, pressure and pain.

  (iii) Sweat glands excrete the waste products (Salts - Nitrogen waste and water).

  (iv) Oil glands secrete oil that keeps the skin smooth.

(d) For the efficient working of skin as excretory organ daily bath is essential. This will remove the waste material deposited on the pores of the outer layer of skin.

Kidney :-

1. Kidney acts as principle organ of excretion :-

(a) There are two, ~~xx~~ dark red, bean shaped kidneys.

(b) They lie asymmetrically close to the dorsal wall of the abdominal cavity.

(c) Each kidney receives pure ~~hoxk~~ blood by renal artery and the impure blood is drawned away by renal views.

(d) The ureters which runs from the inner notch are a pair of slender tubules which finally opens into a thin walled muscular urinary bladder.

(e) When blood passes through the substance of the kidney, urea and other nitrogenous waste is filtered and same is detained in the ureter which is finally collected in the U. Bladder with the contraction of the walls of the bladder, urea etc. passed out of the body.

Nervous system :-

1. Nervous system co-ordinates the activities and functions the body -
   (a) It consists of three systems.
      (i) The central nervous system.
      (ii) The peripheral nervous system.
      (iii) The autonomic nervous system.

   (b) The central nervous system including brain and spinal cord, largely controls voluntary, conscious activities. It enables the organism to respond to the stimuli from the environment.

   (c) The peripheral nervous system consists of net work of nerves given out by the brain and spinal cord.

   (d) The autonomic nervous system largely controls the involuntary, unconscious activities.

[illegible]. Central nervous system comprises of the brain and spinal cord :-

(a) Brain consists of -

(i) Cerebrum is the seat of sensation of hotness and coldness. It is also the seat ef intelligency.

(ii) Cerebcellum is responsible for the co-ordinated activities and of blancing.

(iii) Medullae oblogata is for co-ordinated activities.

(b) Spinal cord :-

(i) In the reflex action, the stimulus is carried from the receptor to the controlling organ through the net work of nerves called as sensory nerves.

(ii) The command or activity is send by the controlling organ to the muscles by motor nerves.

(iii) In this activity brain does not come in the picture.

(iv) Spinal cord is mostly responsible for reflex action.

CLASS IV

UNIT V – MATTER AND MATERIAL

ELEMENTS, COMPOUNDS AND MIXTURES

1. All substances could be classified as Elements, Mixtures and compounds :-

   (a) Elements :-

      i) Substances which cannot be divided ordinarily into anything simpler are called elements.

      ii) There are in all 92 elements found in nature, 12 elements are made in the laboratory. That makes 104 so far known.

      iii) Elements are called building blocks of matter. (All substances are made out of these 92 elements).

      iv) Some elements occur more frequently than others.

      v) Under ordinary conditions most elements occur as solids, some as gases and few as liquids.

   (b) Mixtures :

      i) Substances as an mixing form mixtures.The constituents in a mixture retain their respective properties.

      ii) The properties of a mixture depend upon the properties of the pure substances of which it is framed of.

      iii) In a mixture each comparent retains its properties.

      iv) Substances can be mixed in any proportion in forming mixtures.

2. Substances differ widely in their physical properties :-
   - (a) Some substances have colours while others are colourless.
   - (b) Some substances disolve in water, some do not.
   - (c) Some substances are found under ordinary conditions as solids, same as liquid and some as gases.
   - (d) Some substances (mostly the solids) have granular structure. Some grains are big, some are small. These are called crystals.
   - (e) Some solids do not have a granular structure e.g. glass.
   - (f) Some solids are hard, some are soft, some are brittle , some are malleable, some are ductile, some are elastic etc.
   - (g) Some substances are transparent, some are translucent and some are opaque.
   - (h) Some are conductors while others are insulators with regard to heat.
   - (i) Some solids have lustre.
   - (j) Some substances burn in air.

3. Various substances are used in various ways :-
   - (a) Some are used as fuels.
   - (b) Some are used as a food.
   - (c) Some are used in industries.
   - (d) Some are used in building and construction works.
   - (e) Some are used as germicides.
   - (f) Some are used as fertilizers.

CLASS V

UNIT V - MATTER AND MATERIAL

1. The presence of a matter is experienced in many ways :-
    - (a) Matter can be felt.
    - (b) Matter can be seen.
    - (c) Matter can be tasted.
    - (d) Some matter is used as food.
    - (e) Some matter is used in construction.

2. Matter occupied space and possesses weight :-
    - (a) Matter occupies space :
        - i) The space occupied by a body is called its volume.
        - ii) Solids and liquids keep their volumes fixed whereas gases do not have fixed volumes.
        - iii) Volumes of solids and liquids are measured in various ways.
        - iv) Volume is expressed in litres and cubic centimeters.
    - (b) i) Every piece of matter has its own weight.
        - ii) Weight of a substance may be measured with a balance.
        - iii) The units of weights are grams and kgs.

3. All substances are made of Molecules and Atoms :-
    - (a) Substances are composed of molecules - Molecules of water, salts, sugar etc.
    - (b) Molecule of a substance is the tiniest particle into which the substance could be divided.

(d) A molecule has free existence.

(e) Molecules of a substance are all alike.

(f) They are in state of motion with greater or lesser degree of freedom.

(g) Molecules on further sub-division give atoms.

(h) (i) The number of atoms in a molecule varies from substance to substance.

 (ii) Some molecules consist of a few atoms, one, two, three etc. some molecules are very big and contain thousands of atoms.

(i) Molecules and atoms are to small to be seen even through a microscope.

(j) There are 92 elements found in nature. In all 104 elements are known so far.

(k) All substances in the universe are built out of different atoms of elements.

4. Matter exists in three states - solid, liquid and gas :-

(a) The three states of matter are solids, liquids and gases.

(b) They are all made of molecules.

(c) Solids have (i) their molecules tightly packed, vibrating in their own places.
(ii) fixed shape and size and do not flow.

(d) Liquids have (i) their molecules less tightly packed with freedom to move throughout its bulk.
(ii) fixed size but no definite shape and they flow.

(c) Gases have -

(i) their molecules contained loosely packed with much greater freedom to move about filling up any space.

(ii) no fixed size or shape and they flow rather with great speeds.

5. Matter passes from one state to another by the action of heat -

(a) When a solid is heated, its molecules begin to vibrate more and more rapidly till they break away with greater freedom to move about, solid changes into liquid.

(b) When a liquid is heated, the molecules vibrate still faster escaping into space and the liquid is changed into gaseous state.

6. Matter frequently undergoes changes :-

Matter constantly undergoes changes.

Examples of physical and chemical changes to be given.

CLASS VI

UNIT V - MATTER AND MATERIAL

1. Many solid substances occur in the form of crystals -

(a) The grains of many solid substances have regular Geometrical forms.

(b) These grains with definite forms are called crystals - crystals of alum, mishri, salt, sugar etc.

(c) Some crystals are big, some are quite small. Some are transparent, some are opaque and coloured, some are hare (diamond) and some are soft (graphite) and brittle (sulphur).

2. The crystals occur in some definite shapes - examples and FIGURES -

3. The geometrical and regular shape of a crystal is due to the arrangement of its molecules -

(a) The several known properties of a material are due to the molecular patterns in its crystals.

(i) Due to a particular pattern of molecules in ice crystals, much empty space is left. It explains why ice is lighter than water.

(ii) In a diamond crystal molecules are tightly packed, accounting for its strength and hardness.

(iii) In graphite, crystals form thinsheets, filed loosely one upon another, making it soft and useful for making pencils.

(iv) The strength and malleability of most of the metals is also due to the molecular patterns in their respective crystals, which are too small to be seen even by a microscope.

(v) Some substances such as glass, plastic etc. do not possess crystalline structure.

4. There is a strange kind of force which enables a crystal to hold its moelcular pattern -

(a) If a big piece of a substance is broken it is found to break up into smaller pieces and crystals.

(d) (i) Beautiful crystals of alum are obtained by evaporating saturated solu. of alum.

(ii) Bigger crystals of alum are formed by suspending a nucleus in saturated solutions.

(iii) Crystals of common salt or mishri as large as 4-5 cms may be obtained.

(e) Our understanding of these forces is very poor but we know how they behave.

5. Interesting laboratory methods are available to prepare crystals of common substances :-

(a) Some of the common laboratory methods of making crystals utilize the following treatment.

(i) Dissolving the substance in a liquid and evaporating.

(ii) Dissolving a stuff inhot water and cooling it.

(iii) Melting a solid and draining off the liquid, after a solid crust is formed on its surface.

(iv) By freezing water.

6. Just as a crystal is a cluster of molecules arranged in regular patterns responsible for crystalline structure, a molecule is composed of a number of atoms arranged in -

(a) Crystalline structure is due to molecular patterns.

(b) Molecular structure is due to atomic pattern or arrangement.

(c) Molecules and atoms are in the state of motions.

(d) Molecules are very small. A drop of water contains nearly 10^{20} molecules.

(e) Atoms are still smaller (In an inch length 10^{8} atoms could be made to sit).

7. Just as in a crystal there may be empty spaces between the molecules so also in a molecule, atoms are not all are not all tightly packed -

   (a) A molecule of a substance (Element or compound) is the smallest particle which has an independent existence and has all properties of the substance.

   (b) Molecules in a crystal are arranged in a regular patterns leaving empty spaces. When water freezes into ice, molecules occupy more space.

   (c) Inside a molecule, atoms also group together leaving empty space.

8. On processing or treating substances, changes of one kind or another may be affected. These changes may be Physical or Chemical -

   (a) When substances, single or in combinations, are subjected to various processes such as mixing, filtering, dissolving, heating , melting, burning, putting in electric and magnetic field etc. changes in various forms take place.

   (b) All these changes appearing to be widely different could be classified under two heads -

      i) Physical changes.

      ii) Chemical changes.

   (c) i) Those changes which involve only changes in the physical conditions of the substances taking part are~~s~~ physical changes. On the other hand changes responsible for the formation of a new substance or substances are ranked as chemical changes.

      ii) We could define these changes in terms of atoms and molecules.

A physical change does not concern any kind of regrouping of atoms in the molecules participating in the change.

On the other hand in a chemical change there is a regrouping and rearranging of atoms resulting into different molecular structures identified with the formation of new substances possessing different chemical properties.

[illegible]. During a physical or a chemical change, matter is conserved -

(a) The total number of atoms in substances undergoing a change physical or chemical remains constant i.e. matter is neither created nor destroyed in a physical or chemical change.

(b) In a physical change weights of individual substances involved remains the same in the beginning and at the end.

(c) In a chemical change, sum total of reactants is equal to sum total of resultants.

CLASS VI

UNIT V - MATTER AND MATERIAL

Oxygen

1. Oxygen has wide spread occurrence in nature -

(a) It makes approximately 1/2 of the earths including the atmosphere.

(b) Dry air contains about 20 % oxygen.

(c) Free oxygen is found to be dissolved in natured water where its presence makes life possible.

(d) The most abundant compound of oxygen is water which contains 88 % of the element.

(e) Most of the rocks ~~of~~ and minerals contain oxygen in combined state.

(f) Human body contains 60 % oxygen.

(g) Our food constituents e.g. carbohydrates, fats, proteins contain oxygen.

2. Oxygen can be obtained from various sources :

(a) From liquid air.

(b) By electrolysis of water.

(c) By heating compounds containing oxygen e.g. potassium chlorate, potassium permanganate. (Teachers' guide book only).

3. In physical properties oxygen more on less resembles air :

(a) It is coloures, odourless tasteless gas.

(b) It is slightly soluble in water which systains living animals.

(c) It is slightly heavier than air.

4. Oxygen is one of the active elements :-

(a) Substances burn brightly and more rapidly in oxygen i.e. candle phosphorous, sulphur and magnesium.

(b) Hot iron powder bursts into flames when introduced into a jar of oxygen.

(c) Elements combine with oxygen to form oxides.

• Oxygen is essential for supporting life :-
  (a) Living organisms use oxygen in respiration :

• Oxygen has useful industrial uses :
  (a) Oxygen is used in oxyhydrogen and oxy-acetylene flames for welding and cutting of metal sheets.
  (b) Liquid oxygen is used for combustion of fuels in space rockets.

CLASS VII

UNIT - V MATTER AND MATERIAL

Acids, Bases and salts -

1. Acids are a group of compounds all of which are certain common properties -
   (a) Acids contain hydrogen replaceable by metals.
   (b) Acids have a sour taste.
   (c) Water solutions of acids liberate hydrogen on reaction with an active metal e.g. zinc.
   (d) Acids neutralise bases, forming salt and water.
   (e) Water solutions of acids are conductors of electricity.
   (f) Water solutions of all the acids, have the same effect on acid - Base + Indicators.

2. Bases are a group of compounds which have some common properties :-
   (a) Water solutions of Bases have a characteristic bitter taste.
   (b) Bases neutralise acids to form salt and water.
   (c) Water solutions of bases are conductors of electricity.
   (d) Water solutions of all bases have the same effect on acid-base indicators.

3. Salts are produced by neutralising an acid with a base :
   - (a) An acid on neutralization with a base gives a salt.
   - (b) Salts have the following general properties -
     - (i) Some salts are soluble in water and some are not.
     - (ii) Salts containing water of crystalisation give out an heating.
     - (iii) Solutions of salts in water conduct electric current.

4. Acids bases or salts which in water solution conduct electricity are called electrolytes :

Hydrogen :

1. Discovery of Hydrogen was made in 1766 :-
   - (a) Discovered in 1766 as inflammable gas by the English Chemist Cavendish. It is called hydrogen - because it produces water on burning.
   - (b) Very small amount of free hydrogen is found in some Natural gases.
   - (c) It is found in gases from volcanees also.

2. Hydrogen compounds are abundant in Nature -
   - (a) Water is abundant in nature containing 11.2 percent of Hydrogen by weight.
   - (b) Natural gas and petroleum are chiefly compounds of Hydrogen and carbon.
   - (c) Hydrogen is present in the combined form in fats, vegetable oils, proteins, starches, sugar, wood, cotton, alcohol and the like.

3. All acids contain hydrogen -
   - (a) Common acids containing Hydrogen are -
     - (i) Hydrochloric acid,
     - (ii) Sulphuric acid,
     - (iii) Nitric acid.

4. Hydrogen is liberated from -
(i) water, (ii) acids (iii) Alkalis.

(a) It is prepared from water -

(i) By electrolysis of water.

(ii) By the action of active metals as sodium on water.

(iii) Action of steam on red hot iron.

(b) It is prepared from acids -

By the action of dilute acids on some metals.

5. Hydrogen has specific properties -

(a) Hydrogen is the lightest element.
(b) It is colourless, odourless and tasteless.

(c) It is insoluble in water.
(d) It burns in air or oxygen to form water.
A mixture of hydrogen and air is very explosive.

6. Hydrogen is used in various ways :-

(a) It is used in balloons released by Meteorological stations to study weather conditions.

(b) It is used in the Hydrogenation of vegetable oils.

(c) It is also used in welding and cutting as oxy-hydrogen flame.

CARBON

1. (a) Carbon is found in coal.

(b) Forms of carbon.
i) Lamp - black.
ii) Charcoal
iii) Graphite.
iv) Diamond.

2. Various uses of different forms of carbon. -
   - (a) Charcoal is used as fuel and absorbent.
   - (b) Lamp - black and Carbon black are used in rubber industry and in the preparation of paints, Carbon paper and type-writer ribbons.
   - (c) Graphite is used in pencils.
   - (d) Diamond is used for jewellery and also in cutting glass etc.
   - (e) A form of Carbon is used for making electrodes in cells.

Carbon dioxide gas :-

1. Carbondioxide is one of the important compounds of Carbon and its presence in air even in minute quantity plays a significant rule :-
   - (a) CO_2 is present in small quantity in air about (.03 %).
   - (b) All animals exhale Carbon dioxide.
   - (c) In the presence of sunlight plants absorb CO_2 and give out O_2 - process called photosyn-thesis.

2. Carbondioxide is produced in various ways -
   - (a) CO_2 is obtained -
     - i) by burning carbon,
     - ii) by heating compounds of carbon.
     - iii) by slow bacterical decay of organic matter.
     - iv) by treating limestone lamp (or any other carbonates) with hydrochloric acid.

3. Carbondioxide has a number of important properties :-

   (a) It is colourless, odourless, one and a half times heavier than air, fairly soluble in water, more soluble in water, more soluble under high pressure and changes to liquid carbon-di-oxide under pressure.

   (b) It does not support combustion.

   (c) It dissolves in water to form carbonic acid.

   (d) It turns lime water milky. The turbidity disappears on prolonged passing of the gas.

4. Carbondioxide is put to various uses :-

   (a) It is used in aerated waters.

   (b) It is used in fire extinguishers.

   (c) It is used in the Manufacture of baking power & washing soda.

5. Plants maintain the balance of carbon dioxide in air :-

   (a) It is continuously added to the air by burning and respiration.

   (b) It is continously removed from the air by green plants in the process of photosynthesis.

Soap :-

1. Soap and its properties :-

   (a) When caustic soda is boiled or treated with oil, oil splits up into glycerine and the acids.

   (b) The acids combine with alkali to form soaps.

   (c) Soaps are sodium salts of acids.

   (d) Oils are compounds of glycerine with some organic acids.

   (e) Soap is slightly alkaline.

Uses of soap in washing :-

2. The alkali atom in the soap can be easily replaced by Ca or Mg :-
   - (a) A new compound is formed when soap is dissolved in water containing the compounds of Mg. or Ca. elements.
   - (b) These new compounds are insoluble in water and they precipitate down or come up as a scum on the surface of the water.
   - (c) In such a case, lather is not formed and the water used is called hard - water.

CEMENT

1. Cement is made from two raw materials - limestone and clay :-
   - (a) Lime stone and clay are ground together into a fine powder.
   - (b) The mixture is heated strongly in rotary kilns.
   - (c) The product is crushed to form a powder and small amount of gypsum is added to control the drying and setting of the cement.
   - (d) Cement is prepared in Rajasthan as limestone, clay and gypsum are available.

2. It is used for building purposes :-

   When cement is mixed with sand and water in proper proportion and allowed to stand, it hardens and sets.

PLASTER OF PARIS :

1. Plaster of Paris is made from gypsum -
   - (a) Gypsum is a salt of calcium.

2. Uses of plaster of paris :

(a) When plaster of paris is mixed with water and allowed to dry, it hardens into a firm material.

(b) Mixed with lime and water, plaster of Pris is used to plaster the walls of houses.

(c) It is used in Hospitals to bandage fractured parts of the body.

(d) Plaster of paris is also used in making moulds etc.

Glass :

1. Glass is made by heating a mixture of white sand. powdered lime stone and soda ash :

(a) The mixture is heated in a large furnace for many hours.

(b) The hot liquid is blown or moulded or spread out by huge rollers spread out into long smooth pieces of sheet glass and then allowed to cool and harden.

(c) **

2. Glass manufacturers can colour glass :-

(a) When iron is added, the resulting glass will be coloured green. Cobalt causes glass to appear blue.

(b) Slight green colour seen in ordinary glass is due to the presence of iron as an impurity in the sand used for the manufacture of glass.

3. When glass is hot and soft it can be drawn into fibres -

(a) The fibres can be spun into fabrics.

(b) Fibre glass is a good insulator.

(c) It is used to make bullet proof glass.

4. Glass is a very useful material :-

(a) It is used in windown panes and in mirrors. It is used to make lenses for telescopes, microscopes and spectacle and in hundreds of varieties.

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* When glass is cooled, it is cleaned, polished, and cut into many sizes.

CLASS III

UNIT VI ROCKS, SOILS AND MINERALS

1. Soil is the upper most layer which is fit for cultivation -

(a) The soil occurs in layers.
(b) The top layer (20 c.m. thick) is called top soil.
(c) The soil under neath is sub-soil. It consists of [illegible] lumps.

2. The soil has three major rock constituents :-

(a) The principal constituents are, sand, clay and lime-stone :-
   (i) Sand grains make soil porous, leaving spaces for water and air.
   (ii) Clay makes it sticky and helps the absorption and retention of useful ingradients from permeable fertilizers and manures.
   (iii) Lime stone helps in the neutralization of organic acids formed by the decomposition of organic materials.

3. Soil is transported and deposited from one place to another :-

(a) Important agencies which part-take in transportation and deposition of the soil are :-
   (i) Rains. (ii) Winds.

4. Humus make the soil fertile :-

(a) Humus is the decomposed organic matter.
(b) It is produced by the decay of dead animals and plants.
(c) The first Eight inches of soil is sub-soil and is not rich in humus.
(d) The soil underneath top soil is sub-soil and is not rich in humus.

• Ploughing of soil is necessary for fertility and [illegible] :-

(a) When soil is ploughed the large - lumps break up and makes the soil loose.

(b) Plant roots can penetrate easily in the loose soil.

CLASS IV

UNIT VI - ROCKS, SOILS AND MINERALS

Soils :-

1. Not every type of soil is suitable for agriculture :-

   (a) Soil poor in "humus " is usually not good for crops.

   (b) Soil which is all sandy and has no water holding capacity is of little use.

2. Erosion proves very damaging to the soil :-

   (a) Erosion in general is the eating away or wearing away of the soil.

   (b) Erosion brings about the removal of nutrient materials from the soil.

   (c) Running water and wind are the most powerful agencies to cause erosion.

3. In the interest of agriculture soil erosion must be prevented :-

   (a) Various steps are taken to stop erosion.

   (b) Erosion is reduced by (i) Contour ploughing.

   (ii) Strip cropping (iii) growing trees close together in rows forming shelter belts and by other ways also.

4. The soil is enriched in various ways :-

   (a) Soil is supplied with natural fertilizers to make up the deficiency.

   (b) Chemical fertilizers are also used.

   (c) By the proper rotation of the crops.

The soil is a world in itself, with several changes going on inside it :-

   (a) Much activity goes on inside the soil.

   (b) Air gets into the soil.

   (c) Water, when it enters the soil, pushes out air.

   (d) Water, entering the soil accelerates chemical reactions in the soil.

   (e) Living things myriads of small animals which are always, present in the soil and a great number of micro-organisms, viz. (bacteria) molds, algae etc. play a decisive role in making soil.

Rocks :-

1. The solid part of the Earth's crust is made of hard material called Rocks :-

   (a) Rocks can be defined more or less as definite units constituting the' earths crust. In popular us-age the term rock denotes any hard, solid material derived from the earth.

   (b) Rocks arefound in various sizes.

   (c) Most of the Rocks are usually covered with soil.

2. Rocks are mainly of three kinds :-

   (a) The Rocks are classified according to the process of formation.

   (b) There are different kinds of rocks, mainly igneous, sedimentary and metamorphic.

CLASS V

UNIT VI - ROCKS, SOILS AND MINERALS

MINERALS

1. Minerals are chemical elements or compounds that are found in the Earth's crust :-

   (a) A mineral is a substance having a definite chemical composition and atomic structure and formed by the inorganic processes of nature.

   (b) Minerals have definite crystalline structure.

   (c) Rocks are made up of minerals.

2. Minerals are identified by their characteristics :-

   (a) Minerals possess certain physical properties.

   (b) They have colour and lustre.

   (c) Minerals are either solids, liquids or gases.

   (d) Minerals when rubbed against unglazed porcelain tile give coloured streaks.

   (e) Minerals possess definite form and crystalline structure.

   (f) Some are heavy some are light.

   (g) Hardness of minerals varies from specimen to specimen.

   (h) The minerals break showing a particular fracture.

CLASS VI

UNIT VI - ROCKS, SOLIDS AND MINERALS

1. The Earths' crust is made of solid rocks :-

   (a) The rock are present as continuous layers under the land and oceans.

(b) In the plains, the rocks are covered with soil.

(c) They lie exposed in the mountains and river-cuttings.

(d) Rocks differ in their composition, colour, hardness, texture and many other qualities.

2. Rocks are classified according to their origin :-

(a) Rocks are classified as follows :-

I. Igneous rocks -

(i) These rocks are formed by the cooling and hardening of hot liquid rock.

(ii) They may be present -

(a) on the surface of earth,

(b) below the earth's surface and

(c) between other rocks as for examples granite and basalt.

(iii) Granite is famous for its shining appearance and colour generally used for monuments.

II. Sedimentary rocks :-

(i) These rocks are built up under water by the deposition of sand, clay, mud, gravel etc.

(ii) The pressure of upper layers forces the lower ones to harder into rock.

(iii) The kind of rock produced depends upon the kinds of material deposited e.g. sand stone from sand and coal from plants ;

(iv) These rocks preserve plant and animal remains (fossils).

(v) These rocks are the sources of coal, building material etc.

- [illegible] :-

Rocks formed by the changes of existing sedimentary or igneous rocks on account of high pressure and high temperature are known as metamorphic rocks

e.g.

(i) Hard coal from plant material.

(ii) Marble from lime stone.

- Rocks are the main source of minerals:-

(a) Important minerals of iron, copper, lead, zinc, silver etc. are associatedwith rocks.

- Rajasthan is rich in rocks and minerals :-

(a) Gypsum (calcium sulphate) found in Bikaner Nagour is used for manufacturing ammonium sulphate fertilizer at Sindri (Bihar).

(b) Lignite coal at Palana (Bikaner).

(c) Fullers Earth (Multani Mitti) at Kolayat (Bikaner).

(d) Copper ore near Khetri (Jhunjhunu).

(e) Common salt in Sambhar lake, Phalodi etc.

(f) Lime stome at Swaimadhopur, Chittorgarh, Nimbahera etc.

(g) Mica in Bhilwara.

(h) Lead zinc and silver, Zawarmines, Udaipur.

(i) Soapstone - Udaipur, Khetri, Dausa.

(j) Sand stone in Jodhpur.

(k) Marble in Makrana (Jodhpur).

CLASS VII

UNIT VI - ROCKS, SOILS AND MINERALS

COAL

1. Coal is most used fuel in the world :-
   (a) Fuel is a substance that can be burnt to give out heat.
   (b) Coal is a combustible substance of organic origin.
   (c) The main coal producing regions of the World are U.S.A., England, Germany and France.

2. The coal is formed in sedimentary bedded rocks only :-
   (a) Coal is found in bedded deposits in seems.
   (b) It is found usually with sedimentary rocks like shale, sand stone and limestone.
   (c) The origin of coal is sought in the vast and luxuriant vegetation which fluorished and was burried under the earth's crust in past geological ages.
   (d) Burried vegetable matter when subjected to the effect of pressure and temperature changed into coal.
   (e) Formation of coal dates back to 200-300 million years.

3. Coal is constituted of various components :-
   (a) Coal shows a great variation in its composition.
   (b) Coal contains carbon, hydrogen, oxygen, nitrogen, sulphur and various mineral substances.

4. Coal can be classified in various categories :-
   (a) On the basis of -
      (i) Carbon content (ii) moisture,

(iii) volatile matter, and (iv) ash, coal can be classified into the following principal types.

(i) Peat or decayed and carbonized vegetable matter.

(ii) Lignite or brown coal.

(iii) Bituminous (soft coal).

(iv) Anthracite (Hard coal).

5. Although coal is principally used as a fuel, it is the source of a great many important and useful by products :-

(a) Coal is one of the largest heat energy producing source in the World. It is used in
  (i) Steam engines (Rly) Engines)
  (ii) Iron and steel plants (in the form of coke)
  (iii) In metallurgical factories
  (iv) Power station and other industries.

(b) Out of numerous by products obtained from distillation coal, more important ones are as follows :-
  i) Gas used for lighting and fuel.
  ii) Coke - used in Iron and steel manufacture.
  iii) Ammonia - as fertilizer.
  iv) Dyes and enamel.   v) Explosives.
  v) Tar used in flooring, roofing and road making.
  vii) Paints and varnishes.
  viii) Antiseptics, insecticides and detergents.
  ix) Various useful substances as light oil, fuel,oil,
  x) Saccharine.   xk) Plasticizers.

6. India is rich in coal deposits :-

(a) India is self sufficient in coal
(b) The principal coal fields of India are situated in Behar, Bengal, Orissa, M.P. and Andhrapradesh.
(c) The two most important coal fields of Indiaare i) Jharia and (ii) Raniganj coal fields situated in Bihar.
(d) In Rajasthan Coal is found at Palana near Bikaner.

CLASS II

UNIT VII - ENERGY AND WORK

1. We use heat in life in several ways :-
   - (a) Heat is used for working.
   - (b) Heat is used to warm water.
   - (c) Heat is used to convert water into steam.
   - (d) Heat melts many substances.

2. We get heat in many ways :-
   - (a) Heat is produced on rubbing.
   - (b) We produce heat by burning coal, fuel etc.
   - (c) We get heat from the Sun.

3. We produce fire by burning fuels in air :-
   - (a) When fuels burn in air fire is produced.
   - (b) Fire is accompanied by flames and smoke.
   - (c) For maintaining fire regular supply of fuel and air is necessary.
   - (d) We must observe safety rules as guard against fires.

CLASS III

UNIT VII - FORCE MOTION WORK AND ENERGY

1. Heat can propagate itself from one place to another in three ways :-
   - (a) From a hot body (Fire, heater, stove etc) heat gravels towards to the cooler regions.

(b) When we stand in the Sun or stand in front of fire we feel hot. The heat has travelled from the Sun or the fire to us.

(c) When we touch the far end of a metal bar, whose other end is in fire, we feel it hot. The heat has, travelled to our hand from fire through the rod. By fixing balls of wax along the length of the rod, conduction of heat can be observed.

(d) i) When we put water to warm on a stove, we can feel it hot. The heat has propagated in water heating it.

ii) To see current in water, heat it/in a vessel with crystals of Potassium permagnate at bottom.

(e) The ways of propagation of heat in the three instances - (b), (c) and (d) are different.

i) In (b) heat has travelled directly from the source of you. This mode of heat travel is radiation. Radiation needs no medium. However, intervening medium prevents part of the radiation from reaching you. There are substances like glass etc. which allow heat to pass through them. There are other substances which do not allow heat radiation to pass through them (may be presented in simple form).

ii) In the instance (c) , heat has travelled by the process called conduction. Heat passes from particle to particle.

iii) In the third case heat has propagated by a process called convection. In this made heat is carried all throughout bulk of the substance by the heated particles. Connection is possible in

liquids and gases. Most of non-metals, liquids and gases are poor conductors (may be presented simple form).

3. A thermos flask can hold a substance hot or cold as such for several hours :-

   (a) It is a double walled bottle.

   (b) Inner surfaces are silvered.

   (c) All air is removed from the space between the two walls.

4. Certain substances on burning supply Heat - they are called fuels :-

   (a) Fuels are main source of getting heat.

   (b) Fuels may be solids, liquids or gases.

5. Energy is found in many forms :-

   (a) The form in which we meet energy in life are :-

      i) Energy of moving bodies.

      ii) Heat energy.

      iii) Light energy.
      iv) Mechanical energy.
      v) Electrical energy.
      vi) Magnetic energy.
      vii) Atomic energy.

6. We use energy in several ways in life :-

   (a) Heat energy is used for cooking, warming, dying etc.

   (b) Electric energy is used in electric bulb, electric fans, radio etc.

( ) Mechanical energy is used to pump water from well to pump air in cycle tube, etc. in writing with a pen.

Some familiarity with magnet :-

1. Magnet attracts iron filling or pieces of iron :-

(a) A magnet attracts nails of iron when put near it.

(b) Iron filings clings at two ends when dipped into it and taken out.

(c) A magnet attracts the piece of iron even at some distance.

(d) A magnet placed inside a wooden box attracts iron nails outside it.

(e) A magnet attracts or repels another magnet (may be given in Teachers guide).

2. Magnet points in the definite direction :-

(a) When a magnet is povoted or suspended it points North and South.

(b) Mariners compass is used for location of direction.

(c) The end pointing towards North of a freely suspended magnet is marked North end.

Class IV

UNIT VII – ENERGY

1. When a body is heated its temperature rises :-

   (a) Temperature tells us how hot a body is.

   (b) Flow of heat depends upon temperature difference - it flows from higher temperature to the lower one.

2. Temperature is a measurable quantity, like any other physical quantity.

   (a) Temperature of body is measured in degrees by a thermometer.

   (b) Usually we employ two scales for measuring temperatures.

   (c) Mercury in glass is a very widely used thermometer.

   (d) This type of thermometer is based on the property of expansion of mercury.

   (e) Doctors use mercury thermometers of a special design ; calibrated from 92°F to 110°F. There are thermometers using liquids and gases (at 0°C) may be presented in simple form).

Cont...

• [illegible] readings of centigrade thermometers [illegible] converted into Farenheit thermometers and [illegible]

(a) [illegible] and most convenient method is to plot [illegible] degrees against corresponding Farenheit [illegible] use this graph for the purpose.

• [illegible] used very widely -

(i) Thermometers are used in Laboratories for various experiments.

(ii) [illegible] used to record the temperature of patients.

(iii) [illegible] used in industries to note the temperatures.

• [illegible] are heated in general they expand and on [illegible] contract :-

(a) [illegible] all substances show expansion or contraction [illegible] heating or cooling.

(b) Expansion or contraction with certain substances is [illegible] much pronounced and easily observable.

(c) As a rule gases expand more than the liquids and liquids more than the solids.

(d) The expansions and contractions by heating or cooling find varied applications.

(i) A metallic lid when struck to the mouth of the glass jar, getw lose on heating.

ii) Two glass tumblers struck one inside another can be separated by gently heating the outer one.

iii) Telegraph lines sag, so that during winter they could contract.

iv) Rail road tracks are placed with small gaps between the ends, etc.

[illegible] :

1. Light is a form of energy -

   (a) Like heat, light is a form of energy.
   (b) An incandescent body emits light.
   (c) Heat and light are usually accompanied.
   (d) All luminous bodies emit light.

2. Light enables us to see the World :-

   (a) We see objects when they are illuminated.
   (b) We cannot see in darkness.
   (c) Eye is an organ which enables us to see.

3. Light travels in straight lines :-

   (a) Path of a beam of rays of the Sun entering a dark room through an aperture is straight.
   (b) We are not able to see objects round corners.
   (c) We can change the direction of light by mirrors and reflectors.

4. The objects placed in the path of light casts shadows :-

   (a) Through certain objects light cannot pass.
   (b) They cast shadows, when made to obstruct light.
   (c) The size of shadows casts by objects during day, varies with the position of the Sun in the Sky.
   (d) It is longest at the time of Sun rise and sun set.
   (e) It is shortest at noon.
   (f) It is possible to estimate time by the lengthof shadow of an object in the sun.

- [illegible] classified as opaque, transparent and translucent, according to their behaviour in allowing [illegible] through them :-

(a) [illegible] objects are classified on the basis of their behaviour -

  (i) Opaque.

  (ii) Transparent.

  (iii) Translucent.

[illegible] :

1. [illegible] machines to do various jobs :-

  (a) [illegible] are devices that make work easier.

  (b) Force in the form of push or pull is needed to make a machine work.

  (c) Various agencies produce force -
    - i) Muscles
    - ii) Springs
    - iii) Flowing water
    - iv) Wind
    - v) Sun's rays
    - vi) Magnets
    - vii) Electric current.
    - viii) Expanding steam.

  To give suitable examples.

2. Machines may be simple or complicated :-

  (a) Machines may be very simple.

  (b) Machines may be complicated.

  (c) Machines may be big or small.

  (d) Big and complicated machines consist of various parts.

3. Machines cannot work perpetually :-

   (a) All machines need fuel or power.

   (b) Without fuel no machine can work.

4. Machines need care for efficiency :-

   (a) Machines must be taken care of 2 various parts have to be oiled.

CLASS V

UNIT VII - FORCE, MOTION, ENERGY AND WORK

1. MASS

   Mass is an attribute of matter :-

   (a) Mass is the amount of matter in a body.

   (b) Mass does not change from place to place.

   (c) The units of mass.

   (d) If the mass is small it is expressed in sub-units.

   (e) Platform and pan balances are used to compare masses.

2. DENSITY OF A BODY IS MASS PER UNIT VOLUME :

   (a) Density varies from substance to substance. Examples of light and heavy substances were given.

   (b) Direct method of finding density is to measure its mass and volume and divide former by the latter.

   (c) A substance is lighter or heavier than water as its density is less or more than that of water.

   (d) A body lighter than water floats and a heavier body sinks.

(e) Hollow bodies may float.

(f) Density of water is 1 gm per c.c.

3. GRAVITY

(1) Bodies when dropped from height fall towards the earth :-

(a) All bodies have a tendency to fall towards the earth.

(b) Bodies big or small, heavier or lighter fall through a given distance in the same time.

(c) Suitable example be given

(2) Bodies fall because they are attracted by the earth :-

(a) The earth attracts every body towards it.

(b) The attractive properties of the earth is called gravity.

(c) Galileo was the first to talk about gravity.

4. WEIGHT

(a) Weight represents the pull of gravity on the mass of an object.

(b) The gravity varies with distance from the centre of the earth.

(c) Weight does not stay constant as body is taken away from the earth.

(d) Greater the weight, greater the mass.

(e) Spring balances are used to measure the weight of a body.

5. WORK AND ENERGY

(a) A lump of coal, if burned under a boiler,

produces steam, which can set an engine in motion. Thus Energy is stored in a lump of coal or a gallon of gasoline etc.

(b) Man, animals and birds have capacity to do work in several ways - they have energy in them. They get this energy from food.

(c) Anything that is capable of doing work is said to have energy - infact we measure it by its capacity to do work.

7. ENERGY OCCURS IN DIFFERENT FORMS :

(a) Heat

Heat is released during various process such as burning, chemical changes, change of state etc.

(2) Mechanical energy :

Energy which involves pushing, pulling, turning and the like is mechanical energy.

(3) Electric energy :

(i) Electric Energy is produced in several ways.

(ii) Electric energy is transformed into other forms (a few examples to be given).

(4) Light :

(a) The light of the sun, as we receive, it appears white.

(b) Several colours could be distinctly seen in a rainb~~l~~ow (rainbow).

(c) When light of the sun, on its way, to the surface of the earth, has to pass through the tiny droplets of water, it splits up into colours.

(a) To see a rain-bow we must face away from the sun.

(b) Rainbow seen at sun rise or at sun set are almost complete semi circle above the horizon.

(c) Rainbow seen at other times are only arcs of length smaller than semi-circles.

(d) Rain-bows could be produced in the laboratory allowing Sun light to shine on the spray from a hose pipe.

CLASS VI

UNIT VII - FORCE, ENERGY AND WORK

1. The action of fluids which results in the apparent decrease of the weight of a body is called up thrust :-

1. (a) The fluids exert an up-thrust on bodies wholly or partially immersed.

   (b) The upthrust results in the body losing its weight.

   (c) A body immersed in a liquid weightless . The loss in weight is equal to the weight of the liquid displaced Archimedis Principle.

   (d) A body which sinks, the weight of the displaced liquid is less than its weight in air.

   (e) A floating body has its weight balanced by the up-thrust.

2. Energy and its Behaviour :-

   (1) Heat is a form of energy :-

      (a) Whenever work is done over-coming a frictional force, heat is produced.

( ) In Friction mechanical energy is converted into heat, which is another form of energy.

(2) Temperature refers to the degree of hotness

(a) When a body is heated, its molecules gain in motion. The average kinetic energy increases.

(b) Heat and temperature are related in the sense that higher the temperature, greater is its ability to give heat energy.

(c) A cup of boiling water is hotter than a painful of luke - warm water, but the latter will melt more ice than the former.

(d) Heat flows from a body at a higher temp. to the one at a lower temperature.

(3) Temperature is measured in centigrade or Farenheit thermometer -

(a) Temperatures are measured in degree either on centigrade or Farenheit scales.

(b) To determine maximum and minimum temperatures within 24 hours six's Alcohol thermometer is used (only figure to be given).

• Light

(1) Light is reflected from a smooth or a shining surface according to certain laws :-

(a) When light rays fall on a smooth surface it is thrown back - this action is reflection.

(b) The surface reflecting the light is called a reflector. A plane mirror is a reflector.

[illegible] are used in automobile head lights, [illegible] lanterns etc. Torch lights etc.

[illegible] Reflection from a smooth surface takes place in a regular way.

[illegible] Reflection is governed by two laws called laws of reflections.

(i) Incident ray, normal and reflected ray lie in the same plane.

(ii) Angle of incidence is equal to angle of reflection.

[illegible] A rough surface, also reflects light not in one direction but in all directions in its front. This reflection is called seattering.

[illegible] We see most of the objects by scattered light.

[illegible] The image seen in a plane mirror is due to reflection.

[illegible] A plane mirror gives a vitual image of the same size as the object. It cannot be received on a screen. The image formed by a photographic camera is real . When we look into the mirror " left " appears at " right ".

2. Mirrors are of different types :-

(a) Mirrors may be (i) Plane (ii) Spherical.

(b) Spherical mirror may be concave or convex.

(c) Concave mirrors are used in various ways -

(i) For concentrating rays of the sun or any source . As a shaving mirror.

(d) Convex mirrors are used infront of the driver's in an automobile.

[illegible]

1. A [illegible] suspended points in a definite direction :

   (i) A magnet when suspended will set along north-south direction.

   (ii) The end towards nort h is called N.P. and the other end south pole.

   (iii) A magnetic compass is used to find out the direction.

2. Force between magnetic poles, like poles repel and unlike poles attract :-

   (i) The force of attraction or repulsion depends upon the strength of the Magnet.

   (ii) It falls of rapidly with increase in the distance.

3. A magnet is accompanied by its magnetic field :-

   (i) A compass needle brought into the range of a [illegible] magnet is usually deflected - the region in which such an influence is observed, is called magnetic field.

   (ii) The direction of the field at any point is determined by the direction in which a compass needle sets.

   (iii) The intensity of magnetic field of a magnet at a point depends upon its strength.

   (iv) The intensity diminishes with increasing distance.

   (v) Lines of force may be demonstrated by a floating magnet.

   (vi) The patterns of lines of force may be obtained by sprinkling iron fillings upon a pane of glass laid upon a bar magnet, the iron fillings arranging themselves along the direction of the field.

(g) Diff. patterns are obtained with different arrangements of magnets.

(h) The field is strongest at the poles.

4. A piece of Iron or Steel is magnetised by various methods :-

(a) A piece of iron is magnetised by -

i) By rubbing it with another magnet according to set procedure - method of touch.

ii) By bringing a piece of iron into the magnetic field.

iii) By sending an electric current through a coil of wire wound on a piece of iron. It is called an electro-magnet.

5. Magnet is used for various purposes :-

(a) In finding directions by mariners (Magnetic compass).

(b) In taking out magnetic ores from mines.

(c) In pulling small iron particles or splinters from the delicate parts of the body.

(d) Electromagnets are used in telephone pieces, electric generation, and in various kinds of electrical instrument.

Machine helps man -

1. Machines are devices used by man in many ways to serve various ends -

(a) Help in doing the job requiring tremendous mannual power.

(b) Change the direction of a force.

(c) Help in storing and transporting energy from one place to another.

(d) Convert one form of energy into another.

(e) Do a job more quickly.

(f) Many machines are complicated devices doing several jobs at one and the sametime.

2. All machines need energy of one kind or another -

(a) No machine can work or function without a supply of energy in one form or another.

(b) All machines undergo wear and tear.

3. A complicated machine is made up of simple types of machines -

(a) Complicated machine may be composed of :

i) Leverse
ii) inclined planes
iii) Wheels and axle.
iv) Pulleyes.
v) Screw and
vi) Wedge.

4. Levers are bars and rods, capable of turning about a point -

(a) The point about which it is free to turn is called fulcrum.

(b) The force applied to turnit is called effort.

(c) The resistance over come is load.

5. A beam balance is a kind of lever -

(a) The main parts of a balance are :-

i) Beam - light and long.

ii) Fulcrum - at middle.

iii) Two pans - equal in weight.

iv) -Pointer - fixed at the centre of a beem
and moving in front of a scale.

(b) For accurate purposes a sensitive balance is needed.

(c) A straw balance could weigh a hair.

6. An inclined plane enables to do a piece of work rather gradually but with a smaller force or less efforts:-

(a) An inclined plane is a slopping surface.

(b) A stair case, a pathway up a climb are the examples of inclined planes.

(c) An inclined plane is used to roll or move up heavier objects with case.

(d) Inclined planes are used in several situations.

(e) Itis one of the simplest of all machine.

7. A pulley is a machine used to change the direction of a pull or force -

(a) In its simplest form it is a wheel over which a rope or string is passed.

(b) In a simple case of a pulley suspended from a support over which a string passes with load at one end and effort applied at the other, the load is lifted by exerting a downward force on the string.

(c) A pulley changes the direction of a force, making it convenient to do the job.

(d) Pulley should have very little friction. Friction is feduced by lubrication.

CLASS VII

UNIT VII -- ENERGY

1. Energy is the capacity of a body to do work :-

(a) A body or a system of bodies can sometimes be made to do work. The amount of work which they have the ability to do is the measure of energy.

(b) There are two types of energies. Kinetic energy and potential energy.

2. Kinetic energy is the energy that a body has because of its motion :-

(a) A moving body has kinetic energy.

(b) A moving automobile, flowing water, blowing wind and expanding gas are all examples of kinetic energy.

3. Potential energy is the energy ~~wak~~ that a body has because of its position or configuration -

(a) Potential energy is the storred up energy.

(b) The energy of water stored in a reservoir or a stretched bow are the example of P.E.

(c) The body with a potential energy will not do any work until it is set free or released such as (i) water stored in a dam (ii) a stretched rubber band or wound up spring.

(d) When potential energy is set free it is changed into kinetic energy.

4. Energy manifests itself in various forms :-

(a) Energy is divided into six main groups as follows :
(a) Mechanical energy (b) Heat energy
(c) Electrical energy (d) Wave energy

(e) Chemical energy
(f) Nuclear energy.

(a) Mechanical energy is the form we see most often around us.

(b) All moving bodies have mecnanical energy.

(c) (i) The energy of an electric current is due to the motion of electrons in current carrying conductors.

(ii) A stream of electrons moving through a material is called electric current.

(iii) Electrical energy lights our homes, runs electric motors, and makes our telephones, radios operate.

(d) The waves carry energy.

(i) Sound is a wave phenomenon ; sound waves carry energy.

(ii) Radio waves, radiant heat light, X-rays are all electro magnetic waves carrying energy.

(e) i) Nuclear energy is a newly discovered form of energy.

ii) Atomic reactors are used to harness nuclear energy.

5. Energy can be changed from one form to another :-

(a) Various devices change one form of energy into another.

(i) Electric heater or Iron changes Electricity in to heat.

(ii) Electric lamp changes electricity into light.

(iii) When coal or any other fuel is burnt the chemical energy in the fuel is released and changed into heat energy.

iv) The heat energy is used to change water into steam.

v) Steam turns the turbine to produce mechanical energy.

vi) The turbine runs an electric generator or dynamo-that changes mechanical energy to electrical energy.

vii) The electric energy changes into sound energy in call bell.

(b) In all these changes the energy is not destroyed but changed from one form to another.

Heat :-

1. Change of state occurs at definite temperatures and the heat energy supplied or released during the change of state (solid to liquid or liquid to vapour) is called latent heat :-

(a) Matter is found in three states viz. solid, liquid and gas.

(b) We can bring about a change in state of material by heating or cooling it.

(c) On heating solids become liquids and on further heating liquids turn into vapours.

(d) On cooling vapours condense into liquids and on further cooling it solidifies.

(e) Solids melt at definite temperatures characteristic of individual substances.

(f) The temperature at which a substance melts is called its melting point.

(g) All the heat that is supplied during melting

is used in bringing about the change of state. This is called latent heat.

(h) When liquid solidifies or gas liquifies, the latent heat is given out.

(i) When a liquid is heated a stage is reached at which the temperature does not rise any further and liquid continuously changes into vapour. This temperature is called Boiling point at that pressure.

(j) Heat received during boiling is latent heat.

(k) With decrease in pressure boiling point decreases and with increase it increases.

(l) ~~Wx~~ The M.P. of a substance is also affected by pressure.

(m) In the case of ice melting point is lowered by increase in pressure (Tyndal Expt.).

2. Quantity of heat is measured in colories :-

(a) The calorie is the amount of heat needed to raise the temperature of 1 gm of water in centigrade.

Light

Spherical mirrors may be concave or convex:-

1. (a) A concave mirror converages rays parallel to the principal axis to a point called focus of the mirror.

(b) Since the rays actually converage at the focus producing impression which can be obtained either on the screen or on a photographic plate

mounted suitably, the focus is real.
The distance measured from the pole to the focus is called its focal length.

(c) Any ray incident along the normal at a point on the mirror cuts principal axis at the centre of curvature of the mirror.

(d) The distance of the centre of curvature from the pole is called radius of curvature.

(e) Focus is located midway between mirror and centre of curvature.

2. The formation of the image formed by a spherical mirror is easily explained by considering incident rays in three definite directions :-

   (a) The definite directions for the incident rays used in the study of images are :-

      (i) A ray incident through focus : it is reflected parallel to the principal axis.

      (ii) A ray incident in the direction parallel to the principal axis : it is reflected through focus.

      (iii) A ray incident through centre of curvature : it is reflected back along its path.

ELECTROSTATICS :-

1. On rubbing two materials, transfer of electrons takes place resulting into the separation of opposite kind of charges :-

   (a) Materials are made up of atoms.

   (b) Each atom is built of a nucleus composed of proteins, and neutrons and electrons. The electrons or bit round the~~n~~ nucleus.

(c) i) An electron is very light and carries negative charge.

ii) A protons is much heavier and carries positive charge, equal to the charge of an electron, Neutron, carries no charge but weighs nearly equal to a proton.

(d) Normally an atom is neutral.

(e) When two materials are rubbed together, electrons pass from one material to another.

(f) The material that gains electrons is charged negatively and that which loses electrons is left with positive charge.

(g) The two charges, are naturally equal in amount.

2. The charged and uncharged bodies are attracted by each other like charges repel each other and unlike attracts each other.

(a) A positively charged glass rod attracts pieces of paper.

(b) When the paper touches the rod, some of the electrons from the paper flow into the rod. The pieces acquires positive charge.

(c) Due to repulsive forces between the positive charge on the rod and that on the paper ; the paper falls down.

(d) An Ebonite Rod charged negatively will also attract pieces of paper (explain).

3. Lightening and Thunder are common natural phenomena, which occur during rainy whether :-

(a) Rubbing of clouds produces strong charges in them.

(b) Lightening is produced as huge electric spark when large number of electron jump together from one region to another.

(c) When lightening strikes the Earth, usually electrons flow from the Earth to the clouds or vice versa.

(d) Lightening conductors are safety devices to protect from the damage due to lightening.

(e) During lightening accompanied by thunder, sound is heard appreciablly latter after the flash is seen.

(f) A thunder is caused by electric discharge in clouds which produces sound waves.

The Wet Cell :-

1. A cell is a simple device to get electric current :-

(a) A simple cell is made by dipping a strip of zinc and a strip of copper in a dilute solution of sulphuric acid.

(b) On joining the exposed parts of the strips by a copper wire, electrons flow from the negatively charged zinc to the positively charged copper. This flow of electrons constitutes an electric current (Explaination may be given).

(c) The electrons flow from zinc to copper.

(d) The electricity obtained by the chemical action in a simple cell can be used to light a bulb or to ring a ball.

(e) The dry cell is a more convenient form of cell. It uses carbon and zinc as electrodes and ammonium chloride (electrolyte).

(f) Dry cells are availables in different sizes. The larger the dry cell, the longer it will last.

(g) Dry cells are used in various ways such as in torches, flashlights, portable radios, and doorbell circuits etc.

APPENDIX I

List of members of various faculties of the University of Udaipur, who immensely contributed in the Project work.

1. Dr. Vijay Narayan Mathur - Deptt. of Zoology.
2. Dr. H.R. Tyagi - Deptt. of Zoology.
3. Dr. M.S. Sharma - Deptt. of Zoology.
4. Sh. L.L. Sharma - Deptt. of Zoology.
5. Dr. M.S. Murdia - Deptt. of Chemistry.
6. Dr. L.N. Vyas - Deptt. of Botany.
7. Dr. N.L. Gupta - Deptt. of Geography.
8. Dr. R.S. Gupta - Deptt. of Botany.
9. Sh. K. Gera - Deptt. of Psychology.
10. Dr. S.D. Durve - Deptt. of Fisheries & Zoology.
11. Sh. D.S. Kothari - Deptt. of Physics.

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APPENDIX 2

List of Science educationist, who helped in the Project Work.

1. Dr. Vidya Sagar Sharma : Research Officer - S.I.E.R.T. Rajasthan, Udaipur.
2. Sh. Ghanshyam Sukhwal : Headmaster, Govt. ~~of~~ Sec.School, Dewali (Rajasthan).
3. Mrs. Kiran Gera : Lecturer , Central Institute of Education, New Delhi.
4. Sh. S.C. Soni : Research Asstt. S.I.E.R.T., Rajasthan, Udaipur.
5. Sh. J.M. Bhatt : Headmaster, Govt. Secondary School, Chirwa (Rajasthan).
6. Sh. S.K. Sharma : Headmaster, Govt. Secondary School, Debari.
7. Mrs. Snehlata Sharma : Headmistress, Govt. Kasturba Secondary School, Udaipur.
8. Mrs. Prem Bhatnagar : Senior Teacher, Govt. Girls H.S.S. Residency, Udaipur.
9. Sh. S.K. Varma : Conservator of Forest, Udaipur.
10. Sh. A.L. Sankhla : Conservator of Forest, Jodhpur.

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APPENDIX 3

List of participants of the Seminar organised from 15.1.80 to 17.1.80 in connection with the Project work.

1. Smt. Pushpa Srivastava : A.T. Govt. P.S. Bhinder.
2. Smt. Bhagwati Devi Dixit: H.M. Govt. P.S. Padwa.
3. Smt. Amba Devi Gandharia: A.T. Govt. P.S. Kurabad.
4. Smt. Chandra Kothari : H.M. Govt. P.S. Mor.
5. Smt. Santosh Vadera : H.M. Govt. P.S. Ashoknagar.
6. Smt. Sampat Solanki : H.M. Govt. P.S. Garhi, ~~Sak~~
7. Smt. Kamala Devi Chittora: A.T. Govt. P.S. Salumbar.
8. Smt. Sushila Pancholi : A.T. Govt. P.S. Sagwara.
9. Smt. Ladji Chordia : H.M. Govt. P.S.Rao ji-ka Hata.
10. Smt. Gunmala Jain : A.T. Govt. P.S. Amet.
11. Smt. Shanta Devi Batwal : A.T. P.S. Sardargarh.
12. Smt. Pramila Gandhi : H.M. P.S. Sundarvas.
13. Smt. Shakuntla Sharma : A.T. Govt. P.S. Delwara.
14. Smt. Kamala Lodha : A.T.P.S. Dhoinda
15. Miss. Snehlata Maliwal : H.M. Govt. P.S. Bhupalpura.
16. Smt. Geeta Devi : A.T. P.S. Mogana.
17. Smt. Nirmala Sharma : A.T. P.S. Mandiana.
18. Smt. Chandra Kanta Sharma. : A.T.P.S. Rajnagar.
19. Smt. Prabhawati Devi : A.T.P.S. ~~Rajnagar~~.Chandanwada.
20. Miss. Kanta Devi Bhatt : A.T.P.S. Bedla.
21. Smt. Pushplata Ameta : A.T.P.S. Jagadish Chowk, Udaipur.
22. Smt. Kamala Kumari Varma: H.M.P.S. Khokharwa.

23. Smt. Nirmala Bohara : A.T.P.S. Karagchia.

24. Smt. Premlata Devi : A.T.P.S. Karagadia.

25. Smt. Kama Kumari Joshi : A.T.P.S. Kheradiwara.

26. Smt. Devaki Pandia : A.T.P.S. Gharmala.

27. Smt. Kiran Devi Pandia : A.T.P.S. Gudla.

28. Smt. Negpanchenri Parihar: A.T.P.S. Deogarh.

29. Smt. Geeta Tailor : A.T.P.S. Dhoinda.

30. Smt. Pramila Pandiya : A.T.P.S. Badodia.

31. Smt. Kamala Murawat : A.T.P.S. Partapur.

32. Smt. Sajjan Devi Vaishnav: H.M. P.S. Lothia.

33. Miss. Kamla Devi Garg : H.M.P. Gura.

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APPENDIX : 4

List of Science Teachers from the local primary schools who attended a one day seminar held at Govt. Girls Upper Primary School, Hathipole, Udaipur on 28.2.80.

1. Mrs. Hemlata Sanadya : Govt. U.P.S. Nanigali.
2. Mrs. Snehlata Shrimali : Govt. U.P.S. Jagdish Chowk.
3. Mrs. Pushpa Chelawat : Govt. U.P.S. Jagadish Chowk.
4. Mrs. Rajkumari Singhvi : Govt. U.P.S. Dhanmandi.
5. Miss. Pramila : Govt. U.P.S. Sunderwas.
6. Miss. Lalita Choudhary : Govt. U.P.S. Kheradiwada.
7. Miss. Rekha Singhvi : Govt. U.P.S. Hiran Magri.
8. Mrs. Seema Tarangadi : Govt. U.P.S. Panchwati.
9. Mrs. Jayawanti Rogers : Govt. U.P.S. Panchawati.
10. Miss. Tara Tripathi : Govt. U.P.S. Ashoknagar.
11. Miss. Bilkish Banu : Govt. U.P.S. Boharawadi.
12. Miss. Indira Sodhi : Govt. P.S. Sunderwas.
13. Mrs. Maya Kartikay : Govt. U.P.S. Bhupalpura.
14. Mrs. Premlata Dadeech : Govt.UP.S. Bhupalpura.
15. Mrs. Prem Kunwar Paneri : Govt. U.P.S. Bilochistan Colony.
16. Mrs. Azad Talesara : Govt. U.P.S. Chandpole.
17. Miss. Shanta Kummavat : Govt. U.P.S. Chandpole.
18. Mrs. Kanchan Kummavat : Govt. U.P.S. Chandpole.
19. Miss. Snehlata Doshi : Govt. U.P.S. Garibnagar.
20. Miss. Vimala Patwari : Govt. U.P.S. Hathipole.

APPENDIX 5

List of institutions of Rajasthan, whose heads responded to the questionnaire sent by the investigators.

1.	Govt. Jaswant Hr. Sec. School, Alwar,	Dist. Alwar.
2.	Govt. Secondary School, Khimel,	Dist. Pali.
3.	Govt. Secondary School, Arthuna,	Dist. Banswara.
4.	Govt. Hr. Sec. School, Chittorgarh,	Dist. Chittorgarh.
5.	Govt. Girls Sec. School, Deogarh,	Dist. Udaipur.
6.	Govt. Girls Upper Primary School, [illegible]-Ka-Cho. , Bundi	Dist. Bundi.
7.	Govt. Hr. Sec. School, Dungarpur	Dist. Dungarpur.
8.	Adarsh Vidya Mandir, Jaipur.	Jaipur.
9.	Govt. Girls Sec. School, Kankaroli	Udaipur.
10.	Vidya Niketan Bhilwara	Bhilwara.
11.	Govt. Girls Sec. School, Kota	Kota.
12.	Govt. Girls Sec. School, Jahazpur	Bhilwara.
13.	[illegible] Kanya Vidyalaya, Abu Road	Dist. Sirohi.
14.	Manibahen Girls Sec. School,Simalwada	Dist. Dungarpur.
15.	Govt. Girls U.P. School, Bhattiani Chohatta.,Udaipur.	Dist. Udaipur.
16.	Govt. Girls U.P.S. Jagadish Chowk Udaipur.	Dist. Udaipur.
17.	Govt. Girls P.S. Surajpole, Udaipur	Dist. Udaipur.
18.	Govt. Hr. Sec. School, Pokaran	Dist. Jaisalmer.
19.	Govt. Sec. School, Napasar	Dist. Bikaner.
20.	Govt. Hr. Sec. School, Pisangan	Dist. Ajmer.
21.	Govt. Hr. Sec. School, Aklera	Dist. Jhalawar.

APPENDIX 6

The salient features and design of science education programme for upper primary classes based on environmental approach.

1. Involvement - Students, teachers, parents and experts.
2. Educational goals -
   - (i) appreciation and motivation)
   - (ii) awareness and understanding)
   -) of environment
   - (iii) responsibility and participation)
   - (iv) planning and coordination.)
3. Educational contents - Environmental
   - (i) Interrelationship,
   - (ii) Conservation,
   - (iii) Pollution,
   - (iv) Protection,
   - (v) Promotion.
4. Curriculum design -
   - (i) Multidisciplinary training.
   - (ii) Interdisciplinary understanding.
5. Educational media -
   - (i) Nature - outdoor visits.
   - (ii) Class room
   - (iii) Laboratory
   - (iv) Audio visual materials
   - (v) Models
   - (vi) Discussions
   - (vii) Environmental and ecological association

D. Educational activities -

(i) Exposure

(ii) Data collection

(iii) Measurements

(iv) Experimentation

(v) Communication

(vi) Description.

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प्रश्न – पत्र "ए"

(१) नाम – – – – – – – – – – – – – – – – – –

(२) आयु : – – – – – – – – – – – – – – – –

(३) शैक्षिक योग्यता – – – – – – – – – – – –

(४) शैक्षिक अनुभव – – – – – – – प्रशासनिक अनुभव – – – – –

(५) विद्यालय का नाम जिसमें
कार्यरत हैं : – – – – – – – – – – – – – – – – – – –

(६) वर्तमान पता : – – – – – – – – – – – – – – – – –
– – – – – – – – – – – – – – – – –

विषय :-

वर्तमान पाठ्यक्रम का पर्यावरण से सम्बन्ध है या नहीं इन कारणों का अध्ययन करना ।

नोट :-

(१) कृपया सभी प्रश्नों के उत्तर दें ।

(२) आप अपने विचार निसंकोच होकर व्यक्त करें ।

(३) आपके विचार गोपनीय रखे जायेंगे ।

(४) आप द्वारा दिये गये उत्तरों का उपयोग केवल शोध अध्ययन हेतु किया जायेगा ।

नीचे दी गई सारिणी में आप अपने मतों के आगे निम्न प्रकार अंक दें -

अत्यधिक सहमत	५ अंक
अधिक सहमत	४ अंक
सहमत	३ अंक
असहमत	२ अंक
बिल्कुल असहमत	१ अंक

(२)

(१) आप जिस मत से अत्यधिक सहमत हैं उसे सारिणी में ५ अंक प्रदान करें

(२) अधिक सहमत मत को ४ अंक प्रदान करें।

(३) सहमत को ३ अंक प्रदान करें।

(४) असहमत को २ अंक प्रदान करें।

(५) बिल्कुल असहमत को १ अंक दें।

कृपया अंक दें

(१) वर्तमान पाठ्यक्रम बालकों को समायोजित नहीं करता है।

(२) वर्तमान पाठ्यक्रम में आमूलचूल परिवर्तन आवश्यक है।

(३) पाठ्यक्रम देश की बदलती हुई परिस्थिति, समाज की माँग व बदलते हुए पर्यावरण के अनुकूल है।

(४) समाज में व्याप्त अन्ध विश्वास को हटाने वाला व मानव कल्याण की भावना पर आधारित पाठ्यक्रम है।

(५) विषय वस्तु का समावेश सरलता से जटिलता की तरफ किया गया है।

(६) बालकों के लिये अपर्याप्त पाठ्यक्रम है।

(७) वर्तमान पाठ्यक्रम विज्ञान की विभिन्न मुख्य शाखाओं का समावेश करता है।

(८) वर्ष की निर्धारित अवधि में पूर्ण होने वाला पाठ्यक्रम है।

(९) विज्ञान के उद्देश्यों को पूरा करने वाला पाठ्यक्रम है।

(१०) विषय वस्तु का स्तर बालक की शारीरिक, बौद्धिक व मानसिक क्षमता के अनुकूल है।

(११) वर्तमान पाठ्यक्रम में प्रश्नों का स्तर विषय वस्तु की शैली व विषय वस्तु का स्वरूप छात्र को थका देने वाला है।

(३)

(१२) पाठ्यक्रम को चित्रों के माध्यम से सरल, सरस व मनोरंजक बनाया गया है।

(१३) पर्यावरण की सम्पूर्ण जानकारी पाठ्यक्रम में निहित है।

(१४) विभिन्न पर्यावरण में उपलब्ध पहाड़, पठार, नदी तालाब, झरने, नहरें आदि की विस्तृत जानकारी पाठ्यक्रम कराता है।

(१५) विभिन्न पर्यावरण से जन्तुओं का व वनस्पतियों का तुलनात्मक अध्ययन करने में सहायक है।

(१६) आज का पाठ्यक्रम स्थानीय पर्यावरण के अनुकूल है।

(१७) स्थानीय पर्यावरण के मौसम व जलवायु में अन्तर करने वाला सक्षम पाठ्यक्रम है।

(१८) वर्तमान पाठ्यक्रम विभिन्न स्थानीय पर्यावरण में उपलब्ध वन, वृक्षों व दैनिक जीवन से सम्बन्धित वस्तुओं का पर्याप्त ज्ञान देता है।

(१९) स्थानीय पर्यावरण में उपलब्ध खनिज, लवण, धातु व औद्योगिक क्षेत्रों की सम्पूर्ण जानकारी का प्रमुख स्त्रोत वर्तमान पाठ्यक्रम में है।

(२०) वर्तमान पाठ्यक्रम का पर्यावरण से सम्बन्ध के पक्ष व विपक्ष में तर्कसंगत १० पंक्तियों में अपने सुझाव दें।

प्रश्न - पत्र " बी "

सत्र - :

(१) छात्र का नाम : - - - - - - - - आयु - - - - समय - - - -

(२) कक्षा :-

(३) विभाग : - - - - - - - -

(४) विद्यालय का नाम - - - - - - - - - - - - - - - - - - -

विषय : ""वर्तमान पाठ्यक्रम का पर्यावरण से सम्बन्ध है या नहीं इन कारणों का अध्ययन करना।""

नोट :- (१) कृपया सभी प्रश्नों के उत्तर दें।

(२) आप अपने विचार नि:संकोच व्यक्त करें।

(३) आपके विचार गोपनीय रखे जायेंगे।

(४) आप द्वारा दिये गये उत्तरों का उपयोग केवल शोध अध्ययन हेतु किया जायेगा।

नीचे दी गई सारणी में आप अपने मतों के आगे निम्न प्रकार अंक दें -

अत्यधिक सहमत	५ अंक
अधिक सहमत	४ अंक
सहमत	३ अंक
असहमत	२ अंक
बिल्कुल असहमत	१ अंक

(१) आप जिस मत से अत्यधिक सहमत हैं उसे सारणी में ५ अंक प्रदान करें।

(२) अधिक सहमत मत को ४ अंक प्रदान करें।

(३) सहमत मत को ३ अंक प्रदान करें।

(४) असहमत अंक को २ अंक प्रदान करें।

(५) बिल्कुल असहमत को १ अंक दें।

(२)

सारिणी (कृपया अंक प्रदान करें)

(१) बालकों में अन्तर्दृष्टि व आत्मविश्वास विकसित करने में सक्षम है।

(२) बालक में ईमानदारी एवं उदार भावना का विकास करता है।

(३) बालक को ज्ञान पिपासु एवं ज्ञान प्राप्ति की जिज्ञासा हेतु प्रेरित करता है।

(४) विद्यार्थी जीवन की समस्या को क्रमबद्ध तरीके से हल करना सिखाता है।

(५) विद्यार्थी में अच्छी आदतों व रुचियों का विकास करता है।

(६) बालकों में [illegible] सम्बन्ध स्थापित करने की क्षमता का विकास करता है।

(७) जीवनयापन हेतु बालक को अपनी क्षमतानुसार व्यवसाय चयन हेतु अवसर उपलब्ध कराता है।

(८) बालक में कौशल का निर्माण करता है।

(९) वर्तमान पाठ्यक्रम वान्तरिक से सम्बन्धित आवश्यक जानकारी प्रदान करता है।

(१०) पाठ्यक्रम में समविष्ठ अन्तर्वस्तु का विकास बालक की स्वगतिनुसार किया गया है।

(११) वर्तमान पाठ्यक्रम में चित्र रंगीन होने चाहिये।

(१२) विद्यार्थी में जीवन के प्रति सही वैज्ञानिक दृष्टिकोण विकसित करता है।

(१३) बालक के जीवन में व्यावहारिकता के दृष्टिकोण से सही है।

(२)

(१४) छात्र के जैव सैद्धान्तिक पक्ष का चिन्तन करना है ।

(१५) विद्यार्थियों को विभिन्न पर्यावरण में पाये जाने वाले जन्तु व वनस्पति का तुलनात्मक अध्ययन करता है ।

(१६) छात्र को वर्तमान वैज्ञानिक युग से सम्बन्धित सुखमय जीवन के बारे में सूचना देता है ।

(१७) छात्र को बदलते पर्यावरण की नवीनतम सूचना देने में सक्षम है ।

(१८) विद्यार्थी को दैनिक जीवन में उपलब्ध वस्तुओं का अध्ययन करता है ।

(१९) वर्तमान पाठ्यक्रम में पूर्ण परिवर्तन करना आवश्यक है ।

(२०) वर्तमान पाठ्यक्रम शैक्षिक स्तर (विद्यार्थी) को उपर उठाने वाला है ।

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प्रश्न - पत्र "सी"

क्या आप जानते है कि -

(१) "पर्यावरण" किसे कहते है। हां । नहीं

(२) क्या वायु, जल, भूमि, जीव-जन्तु
एवं पेड पौधों में सम्बन्ध है हां । नहीं

(३) क्या मनुष्य इन सबसे पृथक या
अलग है या इसका एक भाग है हां । नहीं

(४) क्या तुम्हें शुद्ध जल एवं वायु उपलब्ध है हां । नहीं

(५) यदि नहीं तो कारण

- - - - - - - - - - - - - - - - - - -

(६) वन हमारे लिए कैसे उपयोगी है ?

- -

(७) "प्रदुषण" क्या है ?

- - - - - - - - - - - - - - - - - - -

(८) "ऊर्जा" क्या है, इसका मुख्य स्त्रोत क्या है ?

- -

(९) विश्व पर्यावरण दिवस ?

- -

(१०) क्या आप अपने गांव । शहर के मुख्य पेड पौधों एवं जानवरों के
बारे में जानते है ? - - - - - - - - - - - - - - - -

(११) आपके गांव । शहर में रोजगार का मुख्य साधन क्या है ? क्या
इसका सम्बन्ध प्राकृतिक साधनों से है ?

राजस्थान शिक्षा विज्ञान एवं संस्कृति परिषद-उदयपुर

क्रमांक : [illegible]।७८।   दिनांक :

विषय : पर्यावरण पर आधारित अध्ययन :

--००--

प्रिय महोदय / महोदया,

कक्षा छः से आठ तक सामान्य विज्ञान के अध्ययन / अध्यापन को पर्यावरण पर आधारित करने की दिशा में कई स्तरों पर प्रयास चल रहे हैं। लेकिन इनके प्रयास ऊपर के स्तर पर ही होकर रह जाते हैं और विद्यालयों में पढ़ने वाले छात्र / छात्राओं तथा पढ़ाने वाले शिक्षक / शिक्षिकाओं, जो इस कार्य की दृष्टि से अन्त में सबसे महत्वपूर्ण हैं, से राय नहीं ली जाती है। इसी विचार को सामने रखते हुए आपकी सेवामें यह प्रश्न-पत्र भेजा जा रहा है। इनमें प्रश्न पत्र "ए" विज्ञान अध्यापक / अध्यापिका द्वारा तथा प्रश्न पत्र "बी" छात्र / छात्रा द्वारा भरा जायेगा।

यह कार्य आपके रुचिपूर्ण सहयोग पर ही निर्भर है। अतः आपसे आग्रह अनुरोध है कि आप इस कार्य में रुचि लेकर तथा प्रश्न पत्रों को भरवाकर दिनांक १५।१।८० तक कृपया निम्न पते पर भिजवाने का कष्ट करें :-

प्रधानाध्यापिका,
राजकीय कस्तूरबा बालिका माध्यमिक विद्यालय,
उदयपुर (राज०)

आशा की जाती है कि आप वांछित सूचनाएं पूर्ण रूप से भरवाकर निर्धारित तिथि तक भेजने का कष्ट करेंगे।

संलग्न : प्रश्न पत्र ए व बी   भवनिष्ठ

(बी० पी० जोशी)
निर्देशक,
राजस्थान शिक्षा विज्ञान एवं संस्कृति परिषद,
उदयपुर।

INTERNATIONAL YOUTH FEDERATION FOR
ENVIRONMENTAL STUDIES AND CONSERVATION

under sponsorship of the
International Union for Conservation of Nature and
Natural Resources.

वन्य प्राणियों की सुरक्षा एवं संरक्षण

पशुओं को अकारण ही मारना मनुष्यता के लिए एक कलंक है क्योंकि [illegible] के विनाश की अनुमति नहीं दे सकता पशु विरोध नहीं कर सकते, किन्तु पशुओं को भी तो संसार में जीवित रहने का अधिकार है। वे शिकार किये जाने के भय से मुक्त और अपने प्राकृतिक निवास में स्वच्छन्दता पूर्वक विचरण कर सके। प्राकृतिक सामंजस्य के लिए भी इनका होना अत्यन्त आवश्यक है।

वन्य प्राणी (संरक्षण अधिनियम १९७२ में
विशिष्ट प्राणियों को मारने की पूरी तरह मनाही है।
-- वन्य प्राणियों की समृद्धि में सहायता करें

जहां कहीं जंगली जानवर या आकर्षक दृश्य पाये जाते है उन स्थानों को नेशनल पार्क या शरण स्थानों (सेंक्टुअरीज) के रूप में सुरक्षित कर देना चाहिये। इनसे हमारा मनोरंजन होगा एवं शैक्षणिक दृष्टि से भी ये बहुत उपयोगी है।

जंगली जानवरों को अवैध रूप से शिकार करने या जाल में फंसाने वाले लोग राष्ट्रीय सम्पत्ति की चोरी करते है, यह लोग हमारे जंगली जानवरों का कत्ले आम जारी रखा तो एक दिन हम अपनी मूल्यवान विरासत से

[illegible] ने अपना जानवरों में से पहला कुछ [illegible] हैं। एक गाय और एक घार [illegible] जानवरों [illegible] है।

[illegible] हमारे एक महत्वपूर्ण विरासत है। हमें [illegible] जानवरों के आनन्द के लिए इनकी देखभाल करनी [illegible]।

[illegible] उससे पृथक या स्वतंत्र नहीं है। [illegible] नहीं करता और उसे संरक्षण प्रदान नहीं करता [illegible] जाता है तो मानव भी संकट मुक्त जीवन [illegible] है। जंगली जानवर हमें प्रकृति की एक महत्वपूर्ण देन है।

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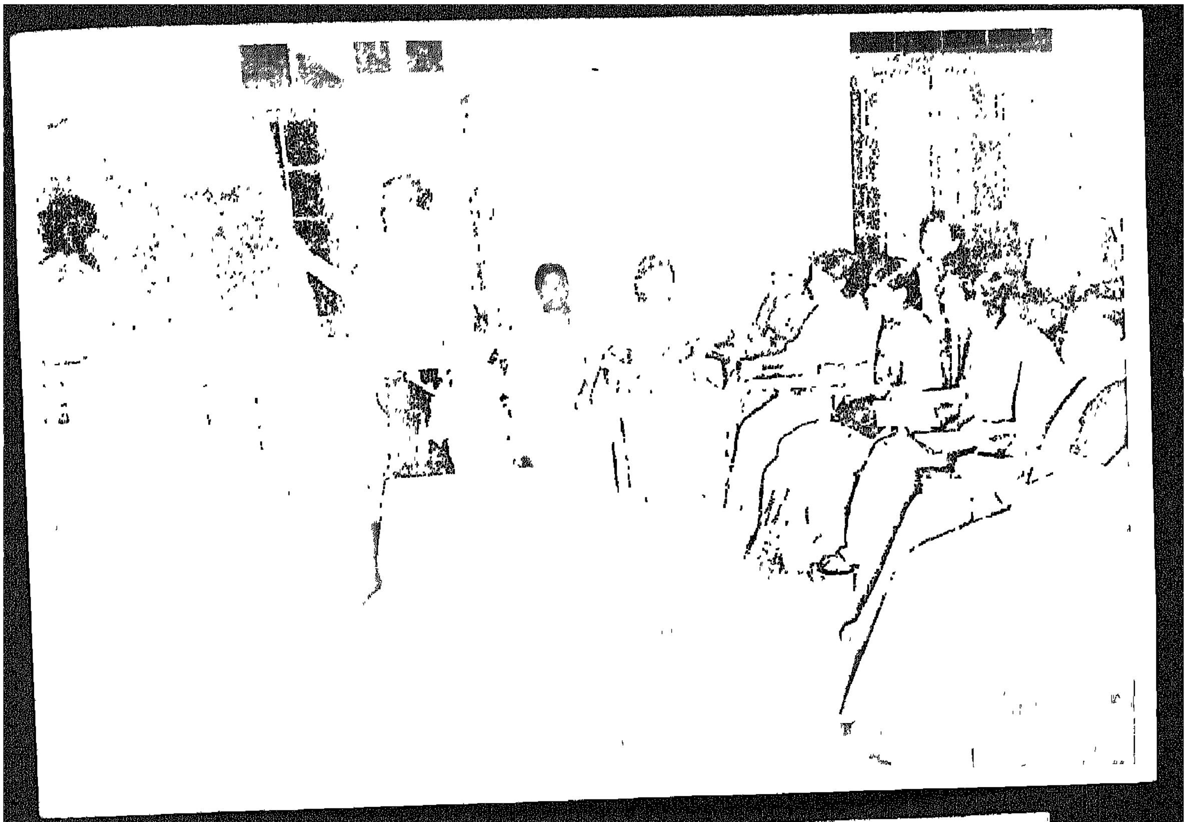
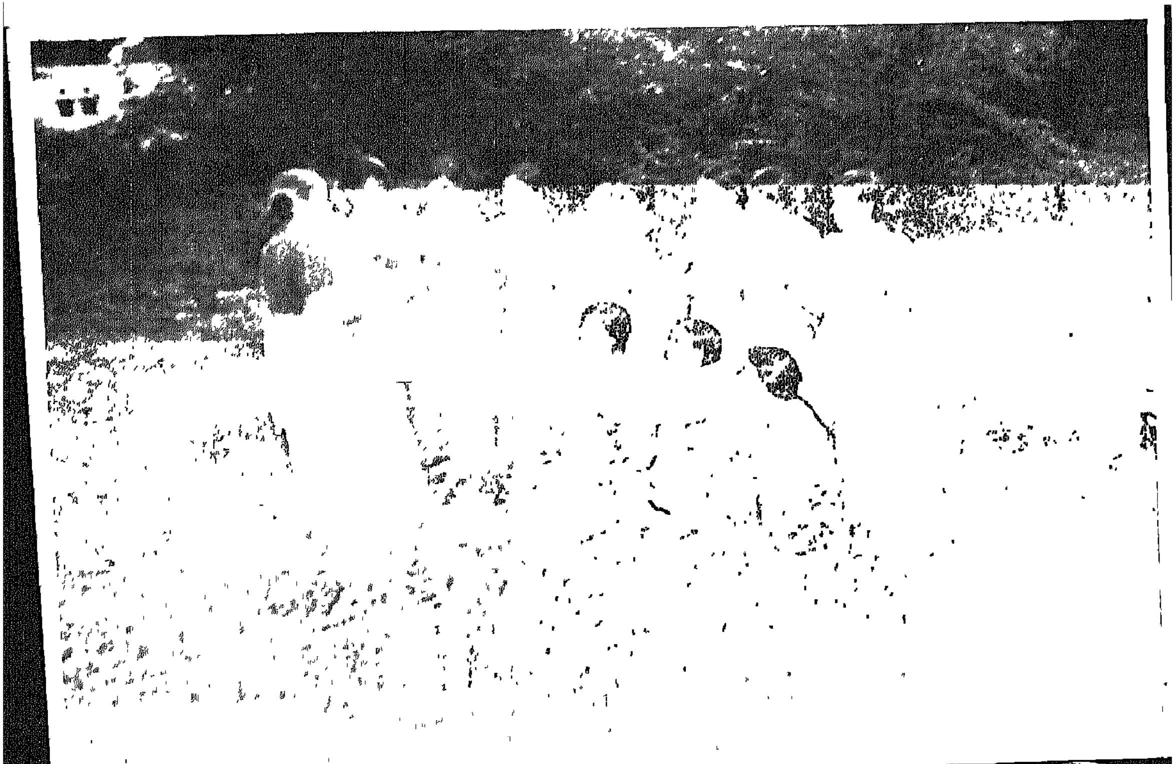


Participants of one day seminar held on 28.2.80

Participants of the Seminar held from 15.1.80 to 17.1.80.



[illegible] on a field visit of the environment.

Science is doing